

Rising prices of agricultural products and their **impact** in Latin America and the Caribbean

- **IICA's response
to rising food prices**
- **Production of fresh foods
in Haiti for self-sufficiency**
- **Nanotechnology:
Opportunities and threats**
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Higher Food Prices and their Possible Impact on Agriculture in Latin America and the Caribbean

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**Program for Fresh Food
Self-sufficiency in Haiti**

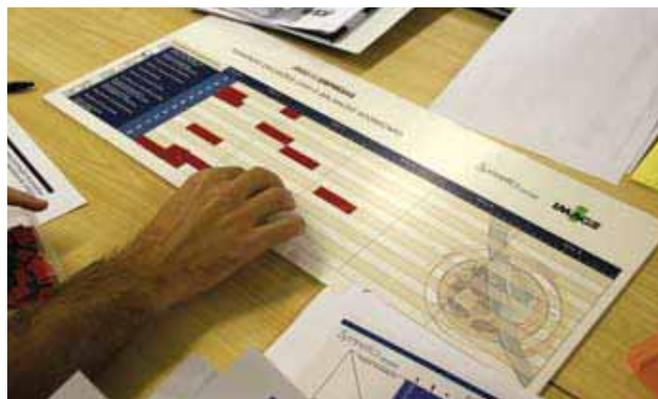
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The international agencies that provide cooperation in agriculture have been impacted greatly by the global phenomenon known as the “crisis” or “boom” in food prices. This multi-factorial phenomenon has made it necessary to reflect on the current situation in agriculture and rural life, and to define the measures needed in the short and long terms to take advantage of the opportunities it has created, while successfully addressing possible negative impacts on developing countries.

Inasmuch as the situation in agriculture and the rural milieu is dramatically different from that of only a few months ago, and given the fact that the elements of the situation are different but complementary in nature, the Inter-American Institute for Cooperation on Agriculture (IICA) believes

is it is important to share the views of our specialists on the subject, especially as regards possible effects, new technologies, innovative projects and institutional modernization. It is hoped that these views will help our readers understand more clearly the opportunities and challenges created by the phenomenon, and answer three hypotheses on its causes:

- a) If the “crisis” or “boom” can be attributed to an *improvement in the incomes and purchasing power of thousands of people who used to be mired in poverty*, it will be necessary to provide the governments and production sectors of their countries with support in tapping this large new group of consumers, whose demands and consumption patterns have changed. This involves improving food productivity in our countries

and ensuring the socioeconomic sustainability of these new consumers so that they can lift themselves even further out of poverty and improve their living conditions.

- b) If the rise in prices is due to the *changes in the price of oil and oil by-products, and their impact on the transportation and inputs sector*, we must help find more creative, efficient and innovative solutions in terms of institutional, trade-related and technological services, so as to ensure competitiveness throughout the agrifood chain. In addition, we must weigh carefully any decision to use land for the production of biofuels rather than food.
- c) Lastly, if the current situation is due to *a deterioration of the environment and its effects on the availability of food*, it is imperative to move forward with the application of the concepts of sustainable agriculture and place greater emphasis on environmentally friendly growth, in order to avoid an expansion of the agricultural frontier biodiversity.

All of these intertwined hypotheses create a critical environment for analyzing and envisioning the future of agriculture in the Americas, which, from our perspective of cooperation, demands new and better technical solutions.

In this edition of **COMUNICA**, readers will find different perspectives on the rise in food prices, the goal being to provide an overview of the situation and its possible impacts on different agricultural activities. Another article focuses on a very important project (Pro-Huerta Program) under way in Haiti, aimed at improving food security for the rural poor.

Another on nanotechnology describes a relatively new field of research and industrial materials development based on the creation of new classes of novel molecular structures. It could lead to advances in agricultural research and food safety diagnostic methods, new environmental remediation procedures, energy applications, etc. However, as stated in the article, more research and regulation are needed, given its potential impact on the environment.

Lastly, an article deals with the adoption, by the Ministry of Agriculture, Livestock and Supply (MAPA) of Brazil, of programs for strategic management based on the Balanced Scorecard (BSC) method, as a means of integrating assets for an institutional reform and, in this way, meet the growing demands of agriculture.

COMUNICA, as an instrument for knowledge management, provides scientific-technical information through articles, serial publications or monographs on topics of importance to agriculture in the hemisphere, for decision makers in the Americas. The present edition, the first in 2008, is also available in electronic format at www.iica.int.



IICA's Response to rising food prices. Placing Agriculture and Food Security as Top Priority Items on the National Development Agendas.

*Cheslton W.D. Brathwaite
Director General of IICA*

The Inter-American Institute for Cooperation on Agriculture (IICA) is looking into the potential impact of the crisis triggered by the sharp rise in food prices on the agricultural sector of the Americas and its implications for consumers, producers and the rural poor.

Our task is to assist our Member States with the technical knowledge and information that can contribute to finding solutions that

will improve food and energy security and promote a sustainable environment for this generation as well as future generations.

The recent pronouncement by the World Bank and others suggests that the observed increase in food prices is not a temporary phenomenon; rather it is a trend that will persist in the medium term.

Four, among other, reasons have been advanced for this situation:



- Increased demand for agricultural products as feedstock for bio-fuel production;
- Droughts in Australia and low crop output in Europe;
- Increased demand for meat protein and cereals, especially in China and India; and
- The increased cost of agricultural inputs such as fertilizers and pesticides as a result of increased oil prices.

We know that a sustained increase in food prices will contribute to higher levels of poverty and poor nutrition in our hemisphere, which is tantamount to limiting the capacity of our countries to achieve the Millennium Development Goal of reducing poverty and hunger by 50% in 2015.

Agriculture and agro-energy

Food prices and food supply are not determined by any single factor and IICA recognizes the enormous potential of renewable fuels for our global energy security, environment and economic well-being, and their likely implications for food security.

However, the debate over bio-fuels production will be less controversial as national governments and their private-sector partners become engaged in developing national agro-energy and bio-fuels policies and regulatory frameworks

that are based on effective economic policies and available scientific knowledge.

In IICA's view, a viable approach to the so called "food versus fuel" predicament has been to diversify the feedstock and the technology from which biofuels are produced, concentrating on products with a longstanding and positive track record, such as sugarcane, in addition to promoting the development of new innovative technologies, such as cellulosic ethanol technology.

In this regard, it has been demonstrated that agro-energy can contribute to the world energy supply without being a threat to food security, if we use non-cereal resources such as sugarcane, oil palm, cellulosic biomass, agricultural waste and Jatropha, among others, for the production of biofuels.

For this, technical studies that promote the use of various feedstocks for biofuels should be encouraged and widely disseminated among decision makers in the national governments and private sector.

Nevertheless, agricultural research and investments in new technologies need to be promoted to make bio-fuels production sustainable, economically viable, environmentally sound and socially equitable.

Moreover, the apparent global imbalance between supply and demand in relation to cereals is now an incentive for producers in developing countries to increase their national cereal production for food in a sustainable manner to take advantage



We believe that the welfare of farmers and food security must be priority items on the national development agenda of each country.



most vulnerable in society from the impact of increasing food prices. At the same time, they should stimulate food production to satisfy increased food demand.

Our Institute is of the view that the time has come for the countries of the Americas to review their food security policies and take appropriate steps to avail themselves of the technical recommendations that will help them design appropriate policies to make agricultural production a priority on the national development agendas and invest more in the rural economies. We believe that the welfare of farmers and food security must be priority items on the national development agenda of each country.

of new opportunities in the internal and external markets. This new scenario is particularly positive for Latin American and Caribbean cereal producers who could increase their crop production in a gradual and sustainable manner, thereby creating new opportunities for their rural populations.

Priorities on the national agendas

Government leaders, civic leaders and leaders of the private sector have inherited an enormous responsibility to contribute to alleviating the critical food situation. To do so, they must come up with programs, investment strategies and national, regional, and hemispheric policies for food and energy security.

These policies, programs and strategies should include actions that protect the

Support for agricultural development and investment in agricultural technology and innovation have been on the decline in many of our countries since the eighties. Official development assistance has also declined substantially. For example, in 1980/1990, 30% of annual World Bank lending went to agricultural projects; in 2007, this figure had dropped to 12 percent.

We are pleased to note, however, that in this new panorama for agriculture, the World Bank published its "2008 World Development Report: Agriculture for Development" in which it considers agriculture to be crucial in reducing poverty. IICA therefore hopes that development institutions and national governments will invest more in agriculture.

IICA's Response

Since 2006, in implementing our Medium-Term Plan for 2006-2010, we have been assisting our Member States in strategic areas such as trade and agribusiness, agro-energy, agricultural health and food safety, biotechnology, agricultural insurance, agro-tourism, rural agroindustry, and organic agriculture, which have great relevance for the promotion of food security in the Hemisphere.

Implementation of the Plan will also assist our countries with the:

- a.** Design of appropriate policies and strategies aimed at improving the welfare of the most vulnerable groups of the rural economy;
- b.** Offer of education and training aimed at improving knowledge, skills and abilities so that vulnerable groups (women, youth and indigenous peoples) may participate effectively in agricultural and rural markets;
- c.** Strengthening of civil society organizations and the promotion of greater interaction among actors in the food chains in order to produce common agendas and improve their ability to negotiate and defend their interests;
- d.** Promotion of the modernization and expansion of agricultural services to improve productivity and competitiveness;

- e.** Strengthening of agricultural and rural organizations in trade capacity and other relevant themes; and
- f.** Promotion of investment in agricultural research, technology and innovation.

It is our firm belief that the Institute's work in these areas, together with the implementation of sound national policies, will help our countries modernize their agricultural sectors and confront the challenges associated with rising food prices and their possible effect on adequate food supply in our Member States.

IICA has embarked upon an intensive process of analysis of the food situation in the hemisphere and its relation to rural life in the Americas through an international workshop on agriculture and food security as an instrument for integral development, held in July of 2008 at IICA Headquarters in San Jose, Costa Rica.

At this time when we face the enormous challenge of food security and an opportunity for agricultural production in this hemisphere, our Institute is prepared to support our countries by providing technical knowledge and information. Through our Representatives in our 34 Member States the Institute will continue to work with national governments, international financial agencies and the private sector in preparing plans and projects to meet the challenges of our time and build a more secure world for all in the area of food sufficiency.



Higher Food Prices and their Possible Impact on Agriculture in Latin America and the Caribbean¹

Julio Paz Cafferata² and Henry Benavides³

Summary

Over the last three years, agricultural prices have risen sharply. Increases in these prices have, however, been less dramatic than increases in the prices of fuels, metals and industrial inputs. The largest increases in the prices of agricultural products have been in the grains, oils and dairy products categories. The effects of international price increases on production, trade and consumption in each country depend on the degree to which these prices are passed on to the respective domestic markets. There are a host of factors that determine these effects: the extent of the dependence of domestic production or consumption on exports or imports, the level of competition and the existence of distortions on the domestic markets, the trade policies applied and fluctuations in the exchange rates of the national currency vis-à-vis the US dollar. The impact of high prices will therefore vary among countries and strata of the population. Insofar as the individual countries are concerned, net exporters of these products will benefit from rising prices, whereas net importers, whose food import bills increase, will be negatively affected. Family units, who are “net food producers”, will benefit from price increases that are passed on, whereas “net consumers”, even those involved in agriculture, will experience a negative impact.

¹ Our thanks to James French, Hugo Chavarria, Tania Lopez, Miguel Garcia, Federico Sancho, Joaquin Arias and Arnaldo Chibbaro for their opinions and contributions to the document.

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Key words: price evolution, agricultural products, impact, agriculture, Latin America and the Caribbean.

Introduction

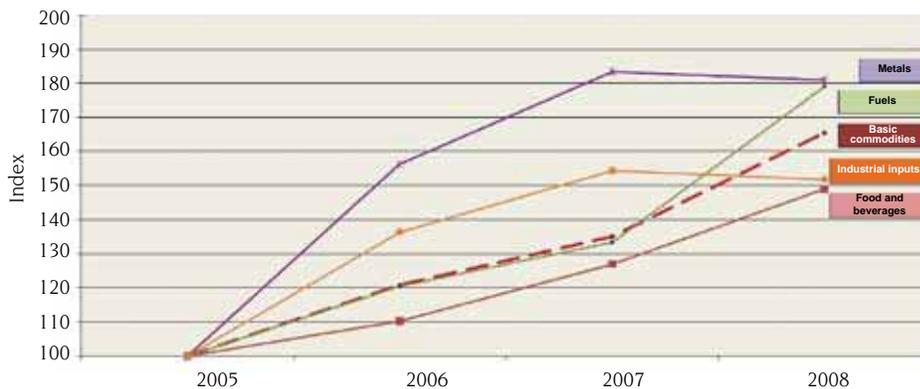
Over the last three years, the international prices of agricultural products have increased at a rapid rate, outpacing significantly the positive trend experienced since the beginning of the decade. International organizations involved in monitoring and making projections about price trends up to 2015 agree that agricultural prices will continue to be high, even though somewhat less so than at present, according to estimates by the World Bank, FAO/OECD and USDA. Everything would seem to suggest that the trend of low agricultural prices that has prevailed over the last 30 years has now been reversed. Projections by the Food and Agricultural Policy Research Institute of Iowa State University indicate that in the

medium term, prices of corn and vegetable oils will be 50% higher than average prices in the nineties; wheat and dairy products will be 40% higher; oilseeds and sugar will be 20% to 26% higher, and meat prices will be 12% to 14% higher (European Commission MAP 2007).

Price Trends from 2005-2008⁴

During the period 2005-2008, the annual average growth rate in relation to **basic commodities** was 16.2%. This growth rate was mainly the result of the sharp increase in the prices of oil and minerals (18.5% and 19.4% annual growth, respectively). On the other hand, the **agricultural products** heading (food and beverages) grew at an annual 13.3%⁵.

Graph 1. International Prices of Selected Basic Commodities, 2005-2008 (Index 2005=100)



Source: IICA, with data from the IMF's World Economic Outlook (as of April 2008)

⁴ Prices have been quoted from the International Monetary Fund's World Economic Outlook Database and, in the case of dairy products, from the FAO's International Commodities Prices.

⁵ Basic commodities include fuels, industrial inputs, metals and food and beverages.



The accumulated price increase for **basic commodities**, as a whole, on the international market through April 2008 was approximately 65% in relation to their annual level in 2005. On the same date, the **agricultural products** heading showed average accumulated price increases of 49%, well below recorded increases in other basic headings such as metals (81%), fuels (79%) in relation to their 2005 average.

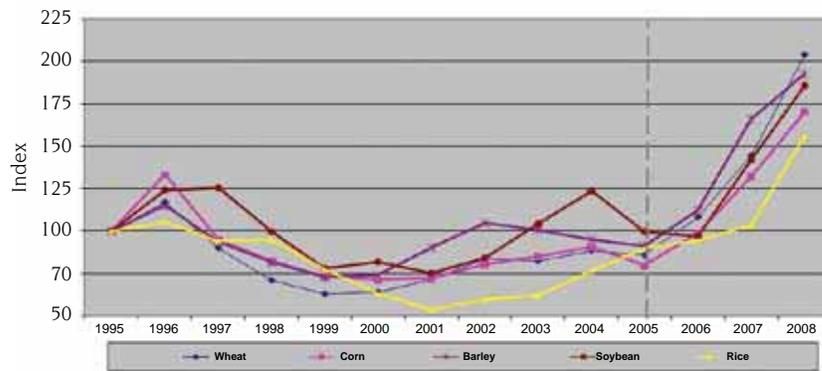
With respect to the basic agricultural commodities, prices of cereals have experienced the highest increase in the last three years, with an annual average 25.9% increase. Four factors explain the upturn in grain prices over the past year:

- a) The increased demand for biofuels;
- b) The increased demand from developing countries, especially China and India;
- c) Low grain inventories worldwide; and
- d) Diminished supply as a result of climate conditions that affected harvests in the main supplier countries (Australia, United States, European Union, Canada and Ukraine).

One additional factor that might be considered and that is cited by some specialists is the entry of speculative capital on commodity exchanges. The increase in financial investments in funds

that are indexed to basic commodity prices has been phenomenal since 2002. These investments have risen from US\$10-15 billion to US\$180 billion in 2006 (Taffel 2007)⁶.

Graph 2. International Price Trends in relation to Grains and Soybeans (Price Indices)



Source: IICA, with data from the IMF's World Economic Outlook (as of April 2008).

It is, however, the price of corn that has been most directly affected by the demand for biofuels. The reason is that corn has been the technological option exercised by the United States to produce ethanol. During the period 2005-2008, the price of corn increased an average 25.7% per annum, primarily as a result of the accelerated growth of demand. Whereas in 2000, the demand for corn to produce ethanol represented roughly 12% of domestic demand in the United States, that share has risen to 32% in 2008. What is more, it should be borne in mind that the United States accounts for 40 per cent of world corn production and 56 per cent of world food aid. Any program to stimulate

production therefore has a direct effect on the international market.

With an average 28.6% increase per annum, the price of wheat has also shown a sharp upward trend in this period, and has increased at a more accelerated pace over the last two years. According to FAO, the price of wheat increased because of a significant decline in production occasioned by climate conditions, mainly in Russia, Ukraine and the United States, and increased demand, which has resulted in unusually low stocks worldwide.

As of April this year, the price of rice on the international market, on the other

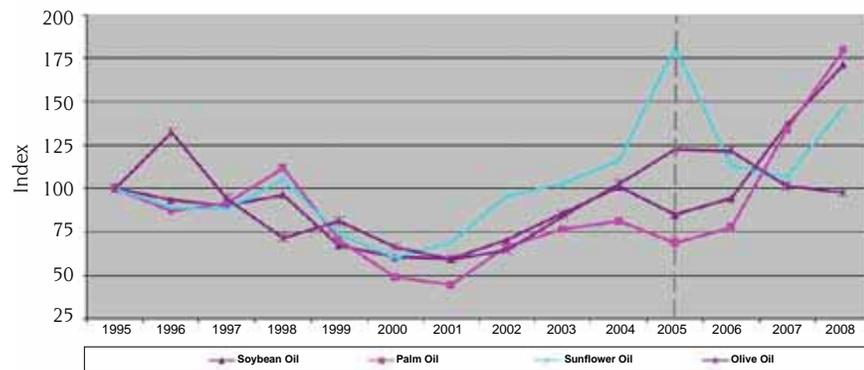
⁶ Refers to basic commodity funds indexed to indicators such as the Commodity Research Bureau Index or the Goldman Sachs Commodity Index.



hand, increased, by more than 50% in relation to the average price in 2007, showing an annual average growth rate of 17.5% in the period 2005-2008. This sharp increase can be explained primarily by the decline in harvests of the major world producers in 2006/07, mainly the United States, which has replaced areas for corn production, and continuing growth in the demand for imports from Asian countries, especially, Indonesia.

The prices of vegetable oils went up an annual average 21.7% over the last three years, thereby fully recovering from the downturn during the five-year period 1997-2002. Two factors explain this substantial increase in prices: the significant rise in world demand for these products, both for direct consumption and for use in biodiesel production; and the increase in the prices of oil-bearing inputs, such as soybean. More significant price increases during the period 2005-2008 have been recorded for palm oil (34.4% per annum) and soybean oil (24.8% per annum).

Graph 3. International Price Trends in Relation to Vegetable Oils (Price Indices)



Source: IICA, with data from the IMF's World Economic Outlook (as of April 2008).

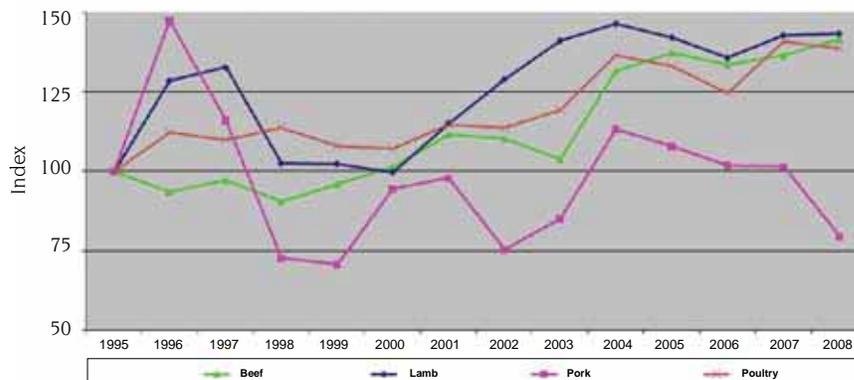


The prices of **tropical** products have also experienced significant annual increases during the three-year period 2005-2008: coffee (11%), sugar (3.1%), banana (4.9%) and oranges and orange byproducts (5.1%). The prices of cocoa bean increased sharply at an annual average 12.7%, after being severely depressed in the first four years of this decade (2000-2004). These products are relatively important in the export baskets of the Andean countries, as well as the Central American and Caribbean countries whose profits from the rising prices of grains, dairy products and other products is nil or very limited since

their production weighs more heavily in other regions.

With regard to **meat products**, prices have increased moderately during the 2005-2008 period and, in the case of pork, prices fell. Prices of beef and lamb increased at an annual average 1% approximately, chicken prices increased by 2.4%, whereas the price of pork dropped by more than 9% on average per annum.

Graph 4. International Price Trends in relation to Meat Products (Price Indices)



Source: IICA, with data from the IMF's World Economic Outlook (as of April 2008).

Since the beginning of this decade, worldwide production and consumption of and trade in livestock products have been affected by sanitary problems, mainly related to Bovine Spongiform Encephalopathy (BSE) in Europe and North America, the emergence of foot-

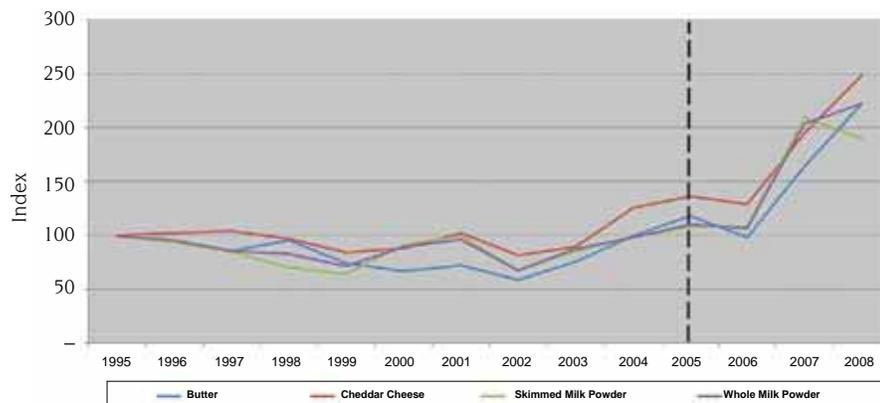
and-mouth disease in certain areas of South America, and Avian Flu in Southeast Asia. Towards mid-2004, the prices of beef and poultry reached their highest levels in the past nine years because of restricted supply resulting from sanitary problems⁷.

⁷ Beef exports from the United States fell drastically in 2004 and have been recovering significantly over the last two years.

Pork prices, in turn, also hit record levels because of displaced demand due to the relative scarcity of other meats and consumer preference for more safety. During the period 2005-2008, with the slowing of outbreaks of diseases, the previously restricted beef markets have been gradually opening up and US production and export levels are recovering, as is confidence in the wholesomeness of these products. As a result, beef prices have stabilized in recent years, reversing in part the substitution of pork meat in previous years. The downturn in pork prices is also associated with the increase in the supply of pork meat and finished pigs in the United States.

Dairy products similarly experienced growth rates of over 22% during the period 2005-2008⁸. This increase is linked to a downturn in supply, as a result of climate change, which has affected large production areas, especially New Zealand and Australia, which are leading producers and exporters. Reduced subsidies applied by the European Union have also affected their dairy supply. On the other hand, demand has been stimulated by increased income in developing countries, chiefly India and China, and by the entry of new dairy byproducts (functional products), which have led to a steady increase in demand in developed countries.

Graph 5. International Price Trends in relation to Dairy Products (Price Indices)



Source: IICA, with data from FAO.

⁸ Includes butter, cheddar cheese, skimmed milk powder and whole milk powder.

International prices of agricultural products and their effects on domestic markets

In order to explain the possible effect of rising international prices on domestic markets, it would be useful to break down the analysis into two parts: first, an estimation of the degree to which changes in international prices are going to be reflected in the domestic prices of given products, whether at the wholesale level, or at the level of the producers or consumers, which is a problem of price transmission; and second, an examination of the distribution of benefits and losses resulting from increased prices among the various population groups.

Price Transmission

The effects of international price increases on production, trade and consumption in each country depend on the degree to which these price increases are passed on to the respective domestic markets. Here, a number of factors come into play, including the following:

- The extent of the dependence of domestic production or consumption on the exports or imports of a given agricultural product. Even in the case of relative self-sufficiency, the transmission depends on the existence of the option to export/import in the face of the new international prices.
- The level of competition and the existence of distortions on the domestic markets (monopolies



in production, distribution or the processing of certain agricultural products).

- The trade policies applied, such as import or export tariffs and restrictions and price stabilization mechanisms.
- Fluctuations in the exchange rate of the national currency in relation to the US dollar, whether free-floating or managed, affect the extent of the price transmission to the domestic market.

Some of the above factors are unrelated to the decision of the intermediaries (wholesalers, importers or exporters) or producers. Others, however, are defined by them, depending on the degree of competition on the domestic market for a given product. One example can illustrate how these factors combine in the determination of the domestic wholesale price of an imported product like corn. The

price of the imported product is a significant reference in defining the price of the same product on the domestic market.

$$P_{Corn}^{Pesos} = P_{Corn}^{US\$} \cdot (1 + f_m) \cdot TC \cdot (1 + t_m + c) \cdot (1 + s_m)$$

The price of the imported corn in national currency on the domestic market (P_{Corn}^{Pesos}) tends to be similar to the price of the corn on the international market in dollars ($P_{Corn}^{US\$}$), to which the percentage of international freight ($1 + f_m$) multiplied by the current rate of exchange, must be added to convert it to national currency. The percentage of import tariffs (t_m) and other related customs charges and delivery costs (c) as well as the importer's marketing margin (s_m)⁹ must be added to that amount.

The impact on the domestic price of the national corn as a result of the increase in the price of its imported equivalent also depends on any changes in other major factors during the same period. As may be seen in this scenario, the importer can only manage his marketing margin directly since the other variables are defined by the external market or by government policies.

If we take a quick look at how these other factors have evolved, we will be able to understand how they have affected domestic prices differently, depending on the importance of factors bearing on specific products or countries:

⁹ The case for export products such as beef is as follows:

$$P_{Beef}^{Pesos} = P_{Beef}^{US\$} \cdot (1 - df_x) \cdot TC \cdot (1 - t_x - c) \cdot (1 - s_x)$$

In other words, the wholesale price of the meat on the domestic market in an export country will be similar to the price of the meat on the international market, multiplied by the exchange rate from which import duties, export costs, exporters' margins, the freight differential vis-à-vis the main world providers (df_x) should be deducted.

- **International price in dollars** (P_{Corn}^{Pesos}): the accumulated increase in the price of corn between 2005 and 2008 (up to April) is 113.4%.
- **International freight ratio** (f_m): This component applies specifically to the product, route and ports. However, costs here have also increased significantly in the period 2005-2008 because of rising oil prices, increased demand for shipping services and the increased cost of passage through the Panama Canal. For example, in 2007, ocean freight for Chilean corn and soybean imports rose from US\$27 to US\$55/ton, an increase of 103% in one year (Association of Egg Producers, Chile, 2008). The cost of transporting one ton of cereals (corn, sorghum, wheat and soybean) from New Orleans to Buenaventura (Colombia) rose from \$22.25 in January 2006 to \$71.13 in November of 2007, i.e., an increase of 219.6% in almost two years (Nuestromar 2007).
- However, the Grain Freight Index from the International Grains Council shows an average increase of roughly 83% for freight costs for dry bulk cargo from May 2005 to April 2008 (International Grains Council, United Kingdom). In the case of countries and products where freight costs in the period under review

have risen more in percentage terms than the international price of the product, the freight ratio (f_m) will be higher and will therefore contribute to a more substantial price transmission.

- **Exchange Rate (ER):** During the period 2005-2008, the value of the national currencies of several countries of the region rose in relation to the US dollar, notwithstanding the neutralization efforts of the respective central banks. The cause of this phenomenon is linked to the rising prices of basic commodities on the international market, which especially favor countries exporting oil, minerals and agricultural products in the region. Other causes are US trade and fiscal imbalances and the speculative flow of capital to certain Latin American and

Caribbean countries in search of better yields. In any event, this relative decline in the value of the dollar in these countries serves as a hedge against increases in international prices, much to the relief of import merchants, and to the detriment of national exporters holding expectations of profits. The currency that has appreciated most in value is the Brazilian *Real*, which now purchases 62% more dollars than in 2005. The national currencies of Colombia, Chile and Peru have, however, also appreciated significantly in value, which has had the effect of relieving the upward pressure on prices in their respective domestic markets.

During the period 2005-2008, the value of the national currencies of several countries of the region rose in relation to the US dollar, notwithstanding the neutralization efforts of the respective central banks.

Table 1. Nominal Exchange Rates, 2005-2008			
Country	2005 (January) US\$/NC	2008 (April) US\$/NC	Increases in exchange rate in relation to the US\$
Argentina	0.34277	0.31560	-7.9%
Bolivia	0.12392	0.13459	8.6%
Brazil	0.37029	0.60077	62.2%
Colombia	0.00043	0.00056	31.6%
Chile	0.00174	0.00220	26.1%
Ecuador	1.00000	1.00000	0.0%
Peru	0.30675	0.36232	18.1%
Mexico	0.08890	0.09593	7.9%

Source: IMF and Central Banks.

- **Import Tariffs (t_m):** In several countries of the region, tariffs have recently been used as an “anti-inflationary” instrument in the face of the spiraling international prices of basic food products. Some Andean countries (Colombia, Ecuador and Peru) have reduced to zero the import tariff applied to cereals (corn, wheat, sorghum), down from the 10% -15% levels that prevailed at the beginning of the period¹⁰.

This reduction in the tariff (t_m) also helps to cushion the impact of external prices on the domestic market. In the case of some countries exporting basic food products from the region, export taxes (t_x) are being applied as a way of reducing the net income of the exporter per unit exported, partially to avoid the “contagiousness” of increases in export prices that have a negative effect on production intended for the domestic market and secure fiscal revenue on the major share of the additional income generated by increased export prices.

In other cases, quantitative restrictions on exports are applied (quotas or prohibitions) to redirect national output to the domestic market and avoid price increases. In all of the previous cases, the purpose of the use of these trade policy instruments is to reduce the transmission of external prices.

- **Other customs clearance and transportation costs (c):** These costs refer to fees for unloading merchandise, storage, administrative customs costs and internal transportation to the wholesale storage. Their impact on the price of cereal imports in several countries may be estimated at three to five per cent before the 2005-2008 period. Because several of these cost components are set in absolute terms (storage fees) and are linked to trends with regard to internal service costs, which have by and large increased moderately in the region, it is highly likely that their percentage increase (c) in relation to higher prices for cereals may have gone down. This would be another factor that would attenuate the price transmission.

- **Importer’s marketing margin (s_m):** This factor is crucial in determining the degree of transmission and it bears specifically on each product in each country, since the extent of this margin depends on the degree of competition in each particular market. However, it also depends on variations in the operating costs of the broker/importer (financial and management opportunity costs, commercial risks, etc.). Maintaining the marketing margin in percentage terms would probably represent an extraordinary increase in the broker’s earning capacity, because brokers’ fees have barely

¹⁰ Colombia and Ecuador are governed by the Andean Price Band System. See Circular no. 314 of the Andean Community, April 4, 2008.

been able to keep up with the rate of growth of imported cereal prices. One can therefore assume that the percentage value of the marketing margin (s_m) may have gone down in many countries of the region.

It is therefore possible to estimate that the degree of transmission of the high international prices of basic agricultural commodities to the domestic markets in several Latin American countries has been attenuated, mainly as a result of direct government interventions (reduction in import tariffs, increase in export tariffs and restrictions) as well as the compensatory effect of movements in the foreign currency market.

Generally speaking, international agricultural prices have been only partially passed on to the domestic markets of the countries and this has occurred as a delayed reaction. Recent studies on experiences with agricultural price transmission show that in Chile the adjustment in milk producers' prices to international prices is slow in relation to other products such as wheat and corn, despite the fact that Chile has more liberalized trade and has several processing companies (Diaz *et al.* 2007). In Costa Rica, in the case of milk, the transmission is nearly nil because of the structure of the domestic market and the high tariff protectionism (Trejos *et al.* 2007).

Finally, price transmission in relation to basic agricultural commodities to the

It is therefore possible to estimate that the degree of transmission of the high international prices of basic agricultural commodities to the domestic markets in several Latin American countries has been attenuated, mainly as a result of direct government interventions (reduction in import tariffs, increase in export tariffs and restrictions) as well as the compensatory effect of movements in the foreign currency market.

finished food products is less pronounced since the agricultural raw material is only one component in the cost structure and its relative weight is less than that of other constitutive variables, such as packing, advertising, transport, wages, *etc.*

In general terms, the transmission will be quicker if the product carries greater weight in the cost structure. For example, it is to be expected that the international price of corn is quickly and more forcefully transmitted in the poultry industry because corn or a substitute grain accounts for some 70 per cent of the total costs. In the high value added food industry, packing and advertising are variables that account for a high percentage of production costs and the transmission of international prices in relation to the raw material is not as forceful.

Notwithstanding, the consumer price index for food, which is already high in many Latin American countries, is having its most direct impact on low-income families.

► *Price transmission in relation to basic agricultural commodities to the finished food products is less pronounced since the agricultural raw material is only one component in the cost structure and its relative weight is less than that of other constitutive variables, such as packing, advertising, transport, wages, etc.*

Table 2. Variations in the food CPI							
Country	1995	2000	2003	2004	2005	2006	2007
Mexico	39.2	6.3	5.0	6.8	5.3	3.7	6.3
Costa Rica	20.5	9.7	9.4	13.7	16.4	11.9	13.9
El Salvador	6.7	0.1	1.6	6.2	6.0	3.1	6.2
Guatemala	8.8	4.3	5.8	10.3	13.2	7.1	9.9
Honduras	28.3	8.7	3.6	6.8	10.0	4.2	9.6
Nicaragua	12.0	5.0	3.7	10.1	11.4	9.7	15.7
Panama	0.6	0.7	1.2	0.8	4.3	1.3	6.7
Bahamas	2.0	1.6	0.5	2.9	3.1	4.7	-
Barbados	2.9	2.3	2.8	4.5	-	-	-
Haiti	24.2	9.7	36.7	35.5	16.6	14.2	8.5
Jamaica	20.3	2.0	9.6	13.5	18.3	6.5	7.7
Dominican Rep.	14.5	0.5	26.6	69.2	-1.6	4.1	6.6
Saint Lucia	7.7	-	-	-	-	-	-
Suriname	231.7	-	-	-	-	-	-
Trinidad and Tobago	15.2	8.3	13.8	12.8	22.9	23.2	17.4
Bolivia	12.0	1.6	3.5	6.0	5.8	5.6	13.7
Colombia	19.2	8.3	7.8	6.2	6.1	5.5	8.2
Ecuador	19.9	120.8	2.4	1.2	2.8	5.6	3.4
Peru	9.3	0.7	0.8	5.6	0.9	2.4	2.5
Venezuela	59.9	11.5	37.7	33.8	21.1	20.1	26.8
Argentina	2.8	-2.6	19.1	5.0	11.0	12.1	11.2
Brazil	55.6	5.1	20.4	4.0	3.1	0.0	6.3
Chile	8.3	1.4	2.8	-1.4	3.0	3.0	8.9
Paraguay	14.3	8.4	21.8	7.5	5.5	15.5	16.8
Uruguay	41.5	5.7	21.6	11.7	4.1	6.2	15.1

Source: CEPAL 2007.

Distribution of benefits and losses

► *Insofar as the individual countries are concerned, these increases would tend to benefit those countries that are net exporters of these products and negatively affect net importers whose food import bills have increased.*

a. The countries

The impact of high prices will vary from country to country and among different strata of the population. Insofar as the individual countries are concerned, these increases would tend to benefit those countries that are net exporters of these products and negatively affect net importers whose food import bills have increased. However, due to the fact that agricultural prices have increased within a context of an overall increase in basic commodities and that the prices of other products such as oil and minerals have increased more than those of agricultural products, the need arises to analyze the global situation with regard to the balance of trade in goods to identify the possible critical situations that could arise in the countries of the region in terms of access to the world food market. Firstly, if we consider solely the three groups of products that have experienced more significant

Table 3. Situation with regard to food dependency, with average figures from 2001-2003

Country	Net Imp./Exp.*		
	Grains	Oils	Dairy products
Argentina	X	X	X
Bahamas	M	M	M
Barbados	M	M	M
Belize	M	M	M
Bolivia	M	X	M
Brazil	M	X	M
Canada	X	X	X
Chile	M	M	X
Colombia	M	M	X
Costa Rica	M	X	X
Dominican Republic	M	M	M
Ecuador	M	X	M
El Salvador	M	M	M
Guatemala	M	M	M
Guyana	X	M	M
Haiti	M	M	M
Honduras	M	X	M
Jamaica	M	M	M
Mexico	M	M	M
Nicaragua	M	M	X
Panama	M	M	M
Paraguay	X	X	M
Peru	M	M	M
Suriname	M	M	M
Trinidad and Tobago	M	M	M
United States	X	X	M
Uruguay	X	M	X
Venezuela	M	M	M

* X= net exporter, M=net importer

Source: Author, based on information from the FAO Statistical Yearbook, Country Profiles.

price increases over the last three years (grains, oils and dairy products) one can observe that in the American hemisphere, only two countries -Argentina and Canada- are net exporters of all these products, and four countries -Costa Rica, Paraguay, United States and Uruguay- are net exporters of two of these agricultural headings. The remaining countries of the hemisphere are net importers of all, or at least, two of these critical headings for food.

Among the net import countries that do not have problems financing food imports are the oil- or mineral-export countries whose trade balance surpluses have increased sharply in the period 2005-2006 in relation to 2003-2004: Bolivia (253%), Chile (148%), Ecuador (594%), Peru (269%), Venezuela (64%) and Brazil (56%). The situation is very different in most of the countries of Central America and the Caribbean where the balance of trade deficit increased significantly in recent years.

Table 4: Balance of Trade – Total Goods							
US\$ 1, 000, 000 current							
Country	2003	2004	2005	2006	2007	Balance*	2006-07/ 2003-04
United States	(578,279)	(707,160)	(828,417)	(881,442)	(853,795)	D	35%
Mexico	(13,107)	(17,539)	(17,930)	(17,728)	(24,534)	D	38%
Canada	27,718	36,617	38,138	30,445	28,823	S	-8%
Belize	(347)	(307)	(385)	(386)	(425)	D	24%
Costa Rica	(1,561)	(1,967)	(2,786)	(3,347)	(3,588)	D	97%
El Salvador	(2,626)	(3,024)	(3,448)	(3,964)	(4,697)	D	53%
Guatemala	(3,668)	(4,438)	(5,118)	(5,902)	(6,652)	D	55%
Honduras	(1,955)	(2,379)	(2,934)	(3,488)	(4,600)	D	87%
Nicaragua	(1,275)	(1,457)	(1,737)	(1,941)	(2,300)	D	55%
Panama	(2,222)	(2,651)	(3,162)	(3,751)	(5,810)	D	96%
Bahamas	(1,337)	(1,428)	(1,810)	(1,932)	(1,920)	D	39%
Barbados	(945)	(1,135)	(1,245)	(1,188)	(1,267)	D	18%
Bermuda	(781)	(915)	(936)	(1,069)	(1,127)	D	29%
Dominica	(88)	(102)	(122)	(125)	(150)	D	45%
Dominican Republic	(2,156)	(1,952)	(3,724)	(4,750)	(6,400)	D	171%
Grenada	(213)	(202)	(291)	(265)	(335)	D	45%
Guyana	(63)	(58)	(237)	(284)	(380)	D	447%
Haiti	(841)	(915)	(984)	(1,105)	(1,000)	D	20%
Jamaica	(2,459)	(2,538)	(3,208)	(3,667)	(3,995)	D	53%
Montserrat	(27)	(24)	(28)	(29)	(28)	D	11%
Saint Kitts and Nevis	(157)	(140)	(176)	(210)	(235)	D	50%
Saint Lucia	(341)	(344)	(415)	(522)	(558)	D	58%
St. Vincent and the Grenadines	(163)	(189)	(201)	(233)	(260)	D	40%

Table 4. (Cont.).							
Country	2003	2004	2005	2006	2007	Balance*	2006-07/ 2003-04
Trinidad and Tobago	1,286	1,516	3,887	7,666	7,243	S	432%
Bolivia	(18)	302	457	1,049	1,039	S	D → S
Colombia	(809)	(522)	(59)	(1,658)	(3,537)	D	290%
Ecuador	(480)	(473)	(187)	615	185	S	D → S
Peru	677	2,708	4,866	8,488	7,771	S	380%
Venezuela	17,974	22,989	31,689	31,594	20,574	S	27%
Argentina	15,732	12,131	11,662	12,411	11,153	S	-15%
Brazil	22,225	30,244	40,901	41,954	34,068	S	45%
Chile	2,342	7,727	8,562	19,707	22,188	S	316%
Paraguay	(986)	(1,470)	(2,027)	(3,973)	(3,906)	D	221%
Uruguay	16	(183)	(474)	(804)	(1,000)	D	S → D

Source: WTO Statistical Database.

For these cases of balance of payments problems brought on by sudden changes in international conditions, there are special funds created by the IMF, such as the Exogenous Shock Facility (ESF), designed to address critical situations affecting low-income countries, and the Compensatory Financial Facility (CFF), created in 1963 to address financial needs of countries

affected by a significant drop in export income or sudden increases in import prices¹¹. In the American hemisphere, only nine countries have access to ESF funds: Bolivia, Dominica, Grenada, Guyana, Haiti, Honduras, Nicaragua, St. Lucia and St. Vincent and the Grenadines. Other countries may access ESF funds, but under less concessionary conditions.

b. Family Units

Independently of the financial capacity of the countries to face the hefty food bill, the transmission of price increases will benefit families that are “net producers” of food, but will seriously affect “net consumers”, even those involved in agriculture, in cases where their earned income or proceeds from the sale of the products is not able to offset increased food expenditures.

The transmission of price increases will benefit families that are “net producers” of food, but will seriously affect “net consumers”, even those involved in agriculture, in cases where their earned income or proceeds from the sale of the products is not able to offset increased food expenditures.



¹¹ The ESF funds are only available for low-income countries, that is to say, countries with a per capita income below US\$1,025 per annum. However, some small island economies have been included as beneficiaries even though their per capita income exceeds that amount.

The consequences of this surge in agricultural prices, which it would seem will continue in the medium term, will vary widely for the various interest groups involved in the sector and the various regions of each country. Among these, the following might be considered:

1. Agricultural producers will benefit directly through increased income to the extent that the international prices are passed on to the various levels of the domestic market. Despite the fact that farmers also face increased costs as a result of increased prices for fertilizers, pesticides and fuels, it is highly possible that the impact will not substantially erode the increase in their earning capacity. What is more, the possible impact of these incentives to produce on employment and agricultural wages may be highly positive in the fight against poverty, which is most severe in the rural areas. Few economic policy instruments can have the necessary scope and coverage to reach the rural poor like the price system.
2. The increase in food prices is directly affecting the expense budgets of families that are “net consumers”, especially urban families or rural workers not involved in agriculture that will offer the direct benefit of increased income for

agricultural activity. However, also in this group are many families involved in agriculture in the Latin American countries, known as family subsistence agriculture, because these are agricultural self-sufficiency units and their income is insufficient in terms of meeting family needs¹².

A recent FAO/IDB study covering six countries of the region found that in Mexico, 44% of agricultural units fall into the category of “family subsistence agriculture”, whereas in Nicaragua, around 74% of units can be classified as belonging to that category. In other words, even in the rural area, the impact of the high prices of food can be very serious in terms of food insecurity in the population.

Table 5. Units of family subsistence agriculture: Share in total agriculture		
Country	In units	In surface area
Brazil	58.4%	14.3%
Chile	47.6%	5.2%
Colombia	69.0%	33.8%
Ecuador	54.1%	20.3%
Mexico	44.1%	22.2%
Nicaragua	74.4%	30.0%

Source: Echenique, 2007.

¹² Family subsistence agriculture is more oriented towards self-reliance, but lands and income generated from production are not sufficient to ensure family reproduction needs, which leads to efforts to find gainful employment outside or within the agricultural sector. See page 41 in Echenique, Jorge (2007).



Food assistance programs targeting populations at risk in both the urban and rural areas will need to be increased in the short term. In many countries in the Latin American region, food programs exist but they are linked to education, health, employment and poverty; these, however, could be expanded in the near future.

3. The increase in the prices of grains directly affects the cost of producing balanced nutrition for animals and the final prices of meat, dairy products and eggs, which involve a high production cost in terms of providing balanced nutrition. It is important to analyze the price transmission in the principal value chains in the agri-food sector in the countries of the region to facilitate their adjustment to the new market situation.

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4. The increase in agricultural prices brought about by the increase in the demand for new uses will also make it possible for more competitors to remain in the domestic and international markets to the extent that certain agricultural products will become or remain more profitable in places where they were not previously. In other words, many marginal agricultural areas may be incorporated into production and new producers will enter the domestic market.

Conclusions

- At the hemispheric level, various situations exist. The countries of South America except for Uruguay, do not have problems with the increased food prices because they are net exporters of food or exporters of oil or minerals for which the terms of trade have improved in recent years, and they have large balance of trade surpluses.
- The Caribbean countries have problems with the increased food bills because they are net importers of food and oil, except for Trinidad and Tobago, where profits from oil and its derivatives have enabled them to pay the imported food bill.
- The Central American countries and Panama, except for Costa Rica, do not produce enough food and the terms of trade have deteriorated in all of them. The deficit in their balance of trade also increased in the period 2005-2006.
- The impact on rural families will also vary significantly among countries and among regions in the same country, depending on the degree of external price transmission to their domestic markets, their production structure and the composition of their agricultural units (commercial agriculture and family subsistence agriculture).
- In population groups, the “net agricultural producers” will benefit directly from increased income to the extent that the international price increases are passed on to the domestic market, at all levels. Despite the fact that farmers have also seen their costs increase (fertilizers, pesticides and fuel), it is highly possible that the impact will not significantly erode their profit margin.
- However, in the case of family subsistence agriculture, which in many countries of the hemisphere, involves a high proportion of agricultural units and which comprises the “net consumers of food”, their situation will depend on the increase in agricultural wages and other “off-farm” income, brought about by the upturn in commercial agricultural production. In the medium term, these production incentives can have a positive impact on employment and agricultural wages, which could be highly positive in fighting poverty.

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Résumé / Resumo / Resumen

► Évolution des prix des produits agricoles: répercussions possibles sur l'agriculture de l'Amérique latine et des Caraïbes

Au cours des trois dernières années, les prix des denrées agricoles ont enregistré une forte croissance, inférieure toutefois à celle affichée par les combustibles, les métaux et les matières premières industrielles. Parmi les denrées agricoles, ce sont les céréales, les huiles et les produits laitiers qui ont subi les plus fortes hausses. Les effets de la hausse des prix internationaux sur la production, le commerce et la consommation dans chaque pays dépendent de la mesure dans laquelle ces prix se répercutent dans les marchés nationaux. Les facteurs qui déterminent ces effets sont nombreux et comprennent notamment : le degré de dépendance de la production ou de la consommation intérieure vis-à-vis des exportations ou des importations; le niveau de concurrence et l'existence de distorsions dans les marchés intérieurs; les politiques commerciales en vigueur, et les variations du taux de change de la monnaie nationale par rapport au dollar des États-Unis. Ainsi, les répercussions des prix élevés seront très différentes selon les pays et parmi les différentes couches de la population. En ce qui concerne les pays, ces hausses profiteront aux pays exportateurs nets des produits concernés et porteront préjudice aux importateurs nets qui verront leur facture d'importation de denrées alimentaires augmenter. Du point de vue des unités familiales, celles qui sont des «producteurs nets» de denrées alimentaires bénéficieront du transfert des hausses de prix, alors que les «consommateurs nets» seront gravement touchés, même s'ils ont un lien avec le secteur agricole.

► Aumento dos preços dos produtos agrícolas: Possível impacto na agricultura da América Latina e do Caribe

Tem sido considerável o aumento dos preços agrícolas nos últimos três anos, embora não tão acentuado como no caso dos combustíveis, metais e insumos industriais. Na linha dos produtos agrícolas, os maiores aumentos afetam os grãos, óleos e derivados do leite. Os efeitos dos aumentos dos preços internacionais na produção, no comércio e no consumo em cada país dependem do grau em que esses preços são repassados aos mercados nacionais. São vários os fatores que definem esses efeitos, entre os quais os seguintes: o grau de dependência da produção ou do consumo interno na exportação ou importação, o nível de competição e a existência de distorções nos mercados internos, nas políticas comerciais aplicadas e nas variações da taxa de câmbio das moedas nacionais com relação ao dólar norte-americano. Em vista disso, o impacto da elevação dos preços será bastante diferente entre os países e entre as camadas da população. No nível dos países, as altas nos preços beneficiarão os exportadores líquidos desses produtos e prejudicarão os importadores líquidos, cuja fatura de importação de alimentos vem aumentando. No plano das unidades familiares, o repasse dos aumentos de preços beneficiará as unidades familiares que são “produtoras líquidas” de alimentos, mas afetará seriamente os “consumidores líquidos”, mesmo os vinculados com a agricultura.

► Evolución de los precios de productos agrícolas: Posible impacto en la agricultura de América Latina y el Caribe

En los últimos tres años, los precios agrícolas han experimentado un fuerte crecimiento, aunque menor que el alcanzado por los combustibles, metales y los insumos industriales. Dentro de los productos agrícolas, los mayores aumentos se han presentado en cereales, aceites y lácteos. Los efectos de los aumentos de precios internacionales sobre la producción, comercio y consumo en cada país dependen del grado en que dichos precios se transmitan a los respectivos mercados nacionales. Son muchos los factores que definen estos efectos, entre ellos: la magnitud de la dependencia de la producción o consumo interno en la exportación o importación, el nivel de competencia y la existencia de distorsiones en los mercados domésticos, las políticas comerciales aplicadas y las variaciones del tipo de cambio de la moneda nacional respecto del dólar estadounidense. Por lo anterior, el impacto de los altos precios será muy distinto entre países y entre los estratos de la población. A nivel de países, estas alzas beneficiarán a aquellos que son exportadores netos de estos productos y perjudicarán a los importadores netos, cuya factura de importación alimentaria se ha visto incrementada. A nivel de unidades familiares, la transmisión de los aumentos de precios beneficiará a los que son “productores netos” de alimentos, pero afectará seriamente a los “consumidores netos”, aun aquellos vinculados con la agricultura.



Program for Fresh Food Self-sufficiency in Haiti

Pro-Huerta 2005-2008¹

Summary

The Pro-Huerta Program was launched in Haiti following an experience with a similar program in Argentina spanning over 15 years. Under this program, training courses in organic vegetable production have been conducted in families, schools, the community and institutions, demonstration gardens have been built, seeds have been delivered and ongoing technical assistance has been provided. The chief objective has been to promote community production of fresh food for the Haitian population through coordinated efforts involving the Ministry of Agriculture of Haiti, its departmental directorates and community organizations, such as schools, orphanages, training centers, farmer associations, women's' associations, professional centers, parishes and congregations of various religious denominations, together with community leaders. The results of this Program have surprised its promoters. This successful enterprise is expected to be expanded for the benefit of more families in Haiti. The project also represents a significant step forward in fulfilling international cooperation commitments.

¹ Collaboration of the National Coordinator the Project for the Government of Argentina, Mr. Agron. Emmanuel Fenelon (emmanuelfenelon@yahoo.com, emmanuelfenelon@hotmail.com) and the Representative of IICA in Haiti, Dr. Alfredo Mena, (alfredo.mena@iica.int)

Key words: *food security, food production, self-sufficiency, family gardens, rural communities, Haiti.*

Background

The Argentine contribution to the United Nations Stabilization Mission in Haiti was furthered by a collaborative effort on the part of the Argentine Horizontal Cooperation Fund in the implementation of the Pro Huerta Program for the Production of Fresh Foods for Self-sufficiency. As a result, community production of fresh foods for the Haitian population has been promoted.

Initially, the governments of Argentina and Haiti signed an agreement in 2005 launching the project through an exchange of notes. That agreement was based on the 1982 Bilateral Agreement for Scientific and Technical Cooperation. Subsequently, two additional documents were signed between the units executing the project: the Office of the Inter-American Institute for

Cooperation on Agriculture (IICA) in Haiti, on behalf of the government of that country, and the Argentine Embassy in Haiti, on behalf of the Government of Argentina.

Subsequently, the project was presented by Argentina to the Haitian authorities at the Conference on International Cooperation with Haiti, held in Cayenne, French Guiana on March 18, 2006. Argentina already had longstanding experience with this

Program after 16 years of success with it in that country. More than 600,000 family gardens, 7,000 school gardens and 8,000 community gardens have been opened in Argentina and have helped to improve the quality and variety of nutrition for more than 3.5 million Argentines.

Experience with the Pro-Huerta Program

As already noted, the Pro-Huerta Program in Haiti was inspired by a national Argentine program executed under the aegis of the National Agricultural Technology Institute (INTA). The Pro-Huerta Program, which is part of the National Food Security Plan of the Ministry of Social Development, promotes a more varied and balanced diet consisting of foods produced by the target populations (urban or rural populations) who do not have a healthy diet because of their social circumstances. The diet includes fresh foods produced in the organic gardens and farms of families, schools, communities and institutions.

It is with this in mind that the Pro Huerta Program that had been implemented in Argentina was replicated in Haiti. The Program was adapted to the Haitian context and the process was guided by a coordinator, of Haitian nationality, who was hired and trained for the purpose. He was charged with conducting and supervising the activities of the local technical assistants and over 500 volunteer outreach workers in 20 locations in various regions of the country.

The Pro-Huerta Program promotes a more varied and balanced diet consisting of foods produced by the target populations (urban or rural populations) who do not have a healthy diet because of their social circumstances. The diet includes fresh foods produced in the organic gardens and farms of families, schools, communities and institutions.



Project activities include training courses, the establishment of demonstration gardens, the delivery of seeds and ongoing technical assistance. The flexibility exhibited and the project's adaptability to local conditions, added to the enthusiasm of participants, have been such that the Program has expanded more than originally expected. According to the IICA Representative in Port-au-Prince, "it is not often that a program meets with success as rapidly as this one has."

Much of that success is due to the fact that the Ministry of Agriculture of Haiti has formed a strong and extended community network, which provided a solid basis

for project activities. This required coordination at the level of departmental directorates and organizations, such as schools, orphanages, training centers, farmer associations, women's associations, professional centers, Catholic parishes and congregations, Baptist and evangelical churches, along with neighbors that showed leadership skills.

In addition to seeing an improvement in the nutritional value of the foods produced in the gardens, families have been able to economize on purchases of fresh vegetables, which has helped relieve the burden of the high cost of living.

Table 1. Type of gardens established in Haiti during this period.	
Family gardens	16,086
School gardens	2,700
Community gardens	1,900
Total	20,686

Table 2. Scope of the Pro-Huerta Program in Haiti.	
Locations	20
Training courses	20
Demonstration gardens	20
Promoters	508
Institutions	25



In short:

"In the many years I have worked at the IICA Office in Haiti, I have had an opportunity to learn about all types of cooperation programs and to participate actively in the execution of successful development projects in the Haitian rural milieu. Although international cooperation often contributes effectively to improving the living conditions of Haitians, "it is not often that a program meets with success as rapidly as this one has."

By previous agreement with the Haitian and Argentine governments, IICA was designated as facilitator of the process for implementation of the Pro-Huerta program. This strategic partnership between IICA-Haiti and the Argentine Foreign Ministry was a very good idea. The synergy between IICA capabilities and those of the FO-AR, the work of the Argentine Embassy in Port-au-Prince and the support of the Ministry of Agriculture of Haiti have yielded positive results and in just one and a half years, thousands of low-income Haitian families now enjoy a more varied, balanced and a healthier diet, thanks to gardens of short-cycle and highly productive species that have a high nutritional value.

Pro-Huerta in Gonaïves has proven to be an effective, low-cost solution to the serious food problems of the Haitian population and has even become an alternative for food security for many inhabitants of that city.

As a member of this partnership, an original participant and close witness of the successful launch of this Pro-Huerta program in Haiti, I express the wish that this program will be extended across Haitian territory."

Alfredo J. Mena
IICA Representative

Coordination of donors: a cooperation strategy

From the standpoint of the FO-AR's cooperation strategy towards Haiti, noteworthy is the experience developed by Argentina in coordinating donors to the Pro-Huerta Program. Two years after activities were launched, international efforts have come together and moved forward significantly in fulfilling the commitment to make international cooperation more efficient and effective.

From the start of the project in September 2005, activities have been coordinated with major international players such as IICA, with which Argentina has concluded two cooperation agreements providing for the delivery of technical assistance and operational support for the Argentine project. Thus, IICA has become a basic on-site partner, especially in Gonaives, where Argentine cooperation has been most widespread geographically. Subsequently, IICA added the Pro Huerta program to its Pwotokol project.

In May of 2006, a joint effort was deployed with the National Democratic Institute, a US nongovernmental organization that is carrying out the Forum Civique Project in the slums on the outskirts of Port-au-Prince and in the Cul-de-Sac Plain, to the west of Port-au-Prince, in keeping with the strategy of engaging donor efforts. The purpose of that project was to promote the establishment of committees for community initiatives, a mechanism that adopted Pro-Huerta as a motivator for social organization.

Later, in October of 2006, joint cooperation activities were initiated with Brazil, through the Project on the Social Validation of Vegetables and the Building of Family Systems, which sought to make available to the target population new vegetable species and mechanisms for catching and conserving drinking water in areas with serious water shortages in the Cul de Sac Plain.

In addition, after the Memorandum of Understanding was signed by the Argentine and Spanish foreign ministers in June 2006, various working meetings were held in Haiti with the Spanish Agency for International Development Cooperation for the purpose of partnering Pro-Huerta with the Spanish program Araucaria XXI. Thus it is that since September 1, 2007, after agreement was reached on the project document, Pro-Huerta activities have been carried out in the Department of the Southeast, in fulfillment of the Argentine idea of improving food security, to which was added the Spanish objective of environmental recovery and conservation. Thanks to these activities, 420 families and four schools located in Belle Anise and Grand Glossier have been included in the program, which has made it possible to strengthen ties with the local population and embark upon a discussion of the terms of an extension of the linkage among the three parties until 2011.

In November of 2007, the working relationship was extended with the Ministry of Agriculture, Natural Resources and Rural Development of Haiti through the signing of a Memorandum of Understanding, reaffirming relations between both



Thanks to the involvement of various counterparts, the Pro-Huerta Program has achieved much success nationally and has been recognized and appreciated by beneficiaries and the community of contributors alike.

governments. Accordingly, Pro-Huerta activities were added to those being carried out under the Project for the Increased Cultivation of Food Supplies, financed by the International Fund for Agricultural Development. Thus, 720 families and 12 schools in six locations in the Lower Central Plateau will be included in this undertaking.

Finally, the FO-AR and the Canadian Agency for International Development initiated talks in November 2006 to join efforts in the area of food security; this is in addition to the Canadian experience in Haiti as well as the Argentine experience as a contributor over a 16-year period.

After much focused effort, a project document was drafted. That project was slated to cover approximately 180,000 people. Specialists from the following organizations were involved in the drafting of that document:

- INTA, the Ministry of Social Development and the Foreign Ministry, on behalf of Argentina.
- The Ministry of Agriculture, Natural Resources and Rural Development and the National Food Security Commission, on behalf of Haiti.

- IICA and the Canadian Agency for International Development.

Final Considerations

The Pro-Huerta Program under way in Haiti since 2005 as part of a horizontal cooperation endeavor between that country and Argentina, has helped to improve the quality of life of thousands of Haitians. It has contributed to their food security by building gardens in families, schools, communities and institutions.

Thanks to the involvement of various counterparts, the Pro-Huerta Program has achieved much success nationally and has been recognized and appreciated by beneficiaries and the community of contributors alike.

It is important to acknowledge the value of the strategies adopted so that this experience, which has been expanded in Haiti, can be replicated in other countries. Undoubtedly, it will be an effective alternative for improving food security and the quality of life of the inhabitants of other regions of the world at a time when humanity is facing a crisis of rising food prices.

Résumé / Resumo / Resumen

Programme autoproduction d'aliments frais à Haïti ProHuerta 2005-2008

Le programme ProHuerta mis en œuvre en Haïti, fondé sur l'expérience acquise en Argentine pendant plus de 15 ans, a permis d'offrir des cours sur la production, de créer des jardins de démonstration, de distribuer des semences et de fournir une assistance technique permanente. Son objectif principal a été d'encourager la production communautaire d'aliments frais pour la population haïtienne, grâce à la coordination des efforts entre le ministère de l'Agriculture d'Haïti, ses directions départementales et des organisations communautaires telles que écoles, orphelinats, centres de formation, associations paysannes, associations de femmes, centres professionnels, paroisses et diverses congrégations religieuses, et dirigeants communaux. On espère élargir cette expérience réussie, à laquelle ont participé plusieurs pays et organismes internationaux, afin qu'un plus grand nombre de familles haïtiennes puisse en profiter, sans compter que cette expérience représente un progrès important dans la réalisation des engagements en matière de coopération internationale.

Programa de Autoprodução de alimentos frescos no Haiti Pró-Horta 2005-2008

O Programa Pró-Horta, implementado no Haiti com base na experiência de mais de 15 anos na Argentina, tem permitido a realização de cursos de capacitação na produção de hortas orgânicas em nível familiar, escolar, comunitário e institucional, a construção de hortas demonstrativas, a distribuição de sementes e a prestação de assistência técnica de forma permanente. O principal objetivo desse programa é incentivar a produção comunitária de alimentos frescos para a população haitiana, mediante uma ação coordenada entre o Ministério da Agricultura do Haiti, suas direções departamentais e organizações da comunidade, tais como escolas, orfanatos, centros de formação e capacitação, associações de camponeses, associações de mulheres, centros profissionais, paróquias e congregações de diferentes denominações religiosas junto a líderes comunitários. Seus resultados no âmbito local vêm surpreendendo os seus promotores. Essa bem-sucedida experiência espera ser ampliada para benefício de um maior número de famílias no Haiti, em razão de que também representa um significativo avanço no cumprimento dos compromissos da cooperação internacional.

Programa Autoproducción de alimentos frescos en Haití: Pro-Huerta 2005-2008

El Programa Pro-Huerta implementado en Haití, con base en la experiencia de más de 15 años en Argentina, ha permitido el desarrollo de cursos de capacitación en producción de huertas orgánicas a nivel familiar, escolar, comunitario e institucional, la construcción de huertas demostrativas, la entrega de semillas y la asistencia técnica permanente. Su objetivo principal ha sido fomentar la producción comunitaria de alimentos frescos para la población haitiana, mediante la coordinación entre el Ministerio de Agricultura de Haití, sus direcciones departamentales y organizaciones de las comunidades como escuelas, orfanatos, centros de formación y capacitación, asociaciones de campesinos, asociaciones de mujeres, centros profesionales, parroquias y congregaciones de diversas denominaciones religiosas, junto a líderes comunales. Sus resultados en el ámbito local sorprenden a sus promotores. Esta exitosa experiencia espera ser ampliada para beneficio de más familias en Haití, además de que representa un significativo avance en el cumplimiento de los compromisos de la cooperación internacional.

Opportunities and Threats from Nanotechnology in Health, Food, Agriculture and the Environment

Ricardo Molins¹

Abstract

Nanotechnology, a relatively new field of research and industrial materials development based on the creation of new classes of novel molecular structures, is making rapid advances that promise to radically change or influence many fields of science and technology. The development of various types of nanomaterials for application in revolutionary medical treatments, agricultural research and food safety diagnostic methods, new environmental remediation procedures, energy applications like solar cell coatings, and even high-volume, everyday products such as cosmetics, dirt-repelling fabrics, and self-cleaning paint, offer innumerable possibilities for human progress. However, it is essential and urgent to assess not only the benefits but also the potential risks posed by nanoparticles, and agree on effective measures to prevent such risks through appropriate regulatory approaches.

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Key words: *nanotechnology, nanomaterials, agriculture, environment, nanoparticles, progress, health, effects.*

What are Nanotechnology and Nanomaterials?

Nanotechnology, from the Greek “nano,” for dwarf, consists of manipulating materials at the atomic and molecular levels to create new molecular structures known as “nanomaterials” having unique and new characteristics that differ from those of the original materials they are derived from. These materials belong to several classes that vary from each other in many basic characteristics such as persistence, reactivity, and behavior in biological systems, to an extent that makes it impossible to generalize about their properties.

Nanotechnology promises to change the world, as we know it, in many ways; for example, from self-cleaning car paint and clothes that never absorb dirt or odors to drug delivery systems able to target specific organs. Nanomaterials are already being produced and marketed and their use in a myriad of applications is only a matter of time. Nanotechnology is taking miniaturization to the ultimate level, the building blocks of nature, where the physical and chemical behaviors of materials are no longer the same. The confluence of nanotechnology with molecular biology and information technology, combined with revolutionary

developments in instrumentation, is opening the door to a new industrial age bordering on science fiction. Recognizing the immense potential of this new field, governments across the world are investing heavily in nanotechnology research in order to stake out a competitive position (Thayer 2002). For example, a National Nanotechnology Initiative (NNI) has been implemented in the United States to promote this technology (NNI 2007).

To place nanomaterials in context, consider that the size of atoms is in the 0.1-1 nanometer (nm) range, whereas simple molecules may be somewhere between 1 and 10 nm, viruses between approximately 10 and 100 nm, and bacteria between 1 and 10 micrometers (μm) (Warad and Dutta 2007). Particles smaller than 50 nm follow quantum physics, whereas classical physics laws apply to larger particles. At the nanoparticle level, changes in electrical, chemical, magnetic, mechanical or biological properties of materials can occur that differentiate them from the corresponding bulk material, albeit with no change in chemical composition. Materials may present new, enhanced characteristics such as flexibility, strength, conductivity, surface tension, and even color when the particles become smaller than 100 nm. However, they also may increase in chemical



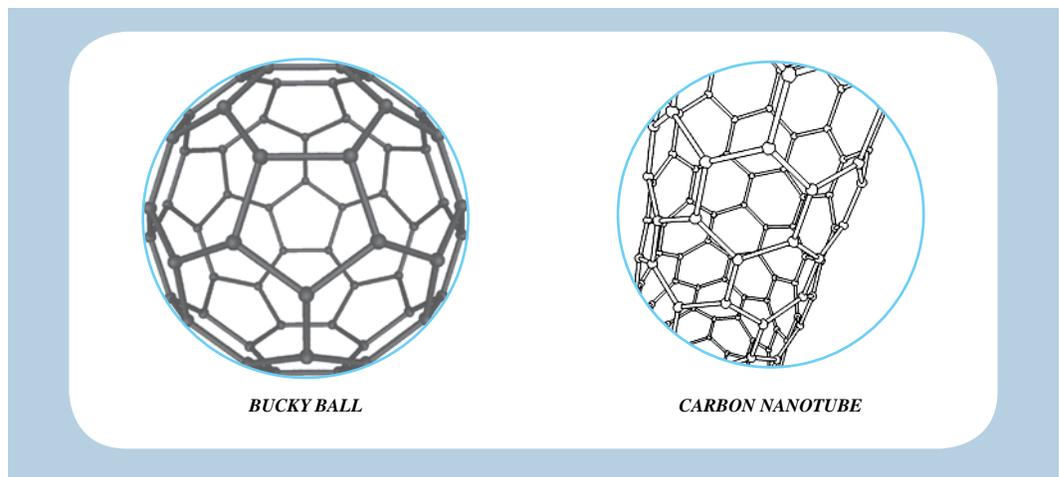
Nanotechnology promises to change the world, as we know it, in many ways; for example, from self-cleaning car paint and clothes that never absorb dirt or odors to drug delivery systems able to target specific organs.

² One nanometer is one-millionth of a millimeter.

▶ *In contrast to traditional material science, which relies mostly on breaking materials down to particles to regenerate them or create new materials, nanotechnology builds materials through self-assembly, beginning with atoms.*

reactivity because of increased surface area to mass ratio. As more atoms are exposed to the exterior, particularly in crystalline nanoparticles, they are more loosely bound and hence more likely to react.

In contrast to traditional material science, which relies mostly on breaking materials down to particles to regenerate them or create new materials, nanotechnology builds materials through self-assembly, beginning with atoms. Truly new materials are being created through the designed arrangement of atoms into nanostructures of various types. “Bucky balls,” for example, also called Buckminster fullerenes, are carbon-based nanostructures configured in ways similar to geodesic domes and resembling soccer balls.



Another type of nanostructure, called “nanotube,” is being manufactured as the building block of new, highly flexible yet extraordinarily strong carbon-based fibers. Nanotubes are hollow cylinders having diameters in the nanoscale range of 1 to 100 nm. Carbon nanotubes, one of the few nanomaterials currently being produced in large volumes, present some unique properties that include high conductivity, high molecular adsorption capacity, and high tensile strength. These

characteristics of carbon nanotubes are being tested for application in fields as diverse as nanoelectronics, optical communications, aviation building materials, laboratory diagnostics, and fuel cells.

Modification of existing materials also offers seemingly limitless opportunities for nanotechnology. Nanoparticles for use in such applications as scratch-resistant glass or plastic, or as additives

in self-cleaning paint for cars and street signs, buildings, and solar cell surfaces, and dirt-repelling clothes are also in the making. Currently, nanoparticles are being used in such diverse applications as making metal surfaces impervious to corrosion and producing clear sunscreen creams.

The Opportunities and Promises of Nanotechnology

Nanotechnology in Medicine

Nanotechnology presents an immense potential to advance many sciences. One of the most visible and potentially most immediate and promising applications of nanomaterials are in medical diagnosis, treatment, and prevention of diseases such as cancer. The vast trove of information generated by the Human Genome Project has brought about advances in cancer genomics and proteomics that, combined with nanotechnology, may revolutionize oncology by manipulating the molecular basis of cancer. To this end, the National Cancer Institute (NCI) of the United States developed a *Cancer Nanotechnology Plan* (CNPlan) and formed a working group, the NCI Alliance for Nanotechnology in Cancer. This comprehensive plan covers the areas of cancer prevention and control, early detection and proteomics, imaging diagnostics, multifunctional therapeutics, and quality enhancement in cancer care (United States Department of Health and Human Services *et al.* 2004)).



In vivo diagnostic applications of nanotechnology, such as magnetic resonance imaging (MRI) contrast agent delivery to cancer cells via nanodevices, could make it possible to detect cancer at very early stages. *In vitro* diagnostics, in turn, is benefiting already from the use of nanoscale cantilevers able to increase the sensitivity of detection methods down to a single molecule for such cancer markers as specific proteins.

One of the most visible and potentially most immediate and promising applications of nanomaterials are in medical diagnosis, treatment, and prevention of diseases such as cancer. The vast trove of information generated by the Human Genome Project has brought about advances in cancer genomics and proteomics that, combined with nanotechnology, may revolutionize oncology by manipulating the molecular basis of cancer.



Nanotechnology in Agriculture, Food and the Environment

Because nanoscale devices or components of larger devices are much smaller than human, animal or plant cells, they may be used to gain access to the inside of cells. This would allow researchers to observe and measure transport of proteins within the cell, for example, as well as to measure gene expression. This opens up a completely new horizon in health and agricultural research in areas such as animal and food plant genetics and conversion of wastes into energy (Thayer 2002; Joseph and Morrison 2006).

Bucky balls, for example, could be coated with antibodies specific to selected organs or cells in the human body and their interior filled with such pharmaceuticals as chemotherapy drugs or therapeutic substances. Once injected into the human or animal body, the bucky balls would act as targeted drug delivery systems that would search for, and eventually gather at and deliver their content to, the targeted organ or cells only. Furthermore, the same drug-delivering nanodevice could carry a tagging contrast agent that would allow confirmation of drug delivery through imaging techniques (Hett 2004).

Other such structures could themselves be targets for magnetic activation to generate localized, tumor-killing heat through high-frequency vibration. Combinations of these capabilities within a single nanodevice have given rise to the concept of the "nanoclinic."

An example of the potential of nanoparticles to penetrate cells is that of a nano-herbicide - under development jointly by agricultural research institutes in Mexico and India - that would attack a weed's seed coating (Roach 2006b)). Germination would be prevented and the seed would thus be destroyed even when it is buried deep in soil, below the reach of tillers and conventional herbicides, because soil particles would not be able to stop the minute herbicide nanoparticles from migrating down.

Other applications for rapid, portable, simultaneous detection of pathogenic bacteria such as *Salmonella* spp., *Escherichia coli* O157:H7 and *Listeria monocytogenes* in foods are in development. Food samples would no longer have to be sent to laboratories, since the analyses would be done at the farm, slaughterhouse or processing plant or during transport.

According to the researchers working on this method of analysis (Roach



2006a)), the process uses nanowires and antibodies so that the presence and type of contamination and its concentration can be simultaneously determined. Individual nanowires are assigned a recognizable pattern of silver and gold stripes akin to a nano-barcode and set on a strip. Specific pathogen antibodies are then attached to each nanowire. For example, nanowire-one could have the antibody to *Salmonella* and nanowire-two the antibody to *E. coli*. During use, these strips are placed on the meat or other food and if *Salmonella* is present, the cells will bond with the corresponding antibody on nanowire-one.

Detection is made possible by using a fluorescent solution that contains a multitude of antibodies. The nanowires are then exposed to the fluorescent antibodies cocktail and the pathogens, already bonded with antibodies on the nanowires, will also bond with the corresponding fluorescent antibodies in what is known as a "sandwich immunoassay." Because each nanowire is recognizable by its gold and silver striped pattern, an electronic processor will instantly be able to tell which pathogens are present and in what

concentration. According to another group of researchers working on a similar system, detection time could be as little as 15 minutes (El Amin 2006).

In addition, light emitting nanoparticles linked to antibodies may be used to develop assays capable of simultaneously detecting multiple chemical substances, something that may find invaluable applications in toxicology such as multiple pesticide residue detection and quantification (Thayer 2002; Joseph and Morrison 2006). This type of assay would be invaluable to determine the safety of foods.

In environmental protection, nanotechnology is finding applications in photocatalysis, a process in which light promotes a reaction between compounds such as pesticide residues and the nanomaterial without the latter being consumed. Such a process would be useful in decontamination of water for agricultural and human use. For example, elimination of oils, agrochemicals and waste products - including biological contaminants such as viruses - via photocatalysis, using nanomaterials made of titanium oxide (TiO_2), has been widely and successfully

studied. In food safety, photocatalysis could find uses in cleansing the surface of fresh fruits and vegetables of toxic agrochemical residues and in destroying bacteria on such produce (Joseph and Morrison 2006).

In the area of agricultural production and marketing, Warad and Dutta (in Thayer 2002) make a good case for future application of nanomaterials in nano-barcodes. These invisible barcodes could be extremely useful for tagging fruits, vegetables and many other agricultural products at the farm, for subsequent electronic traceability throughout the food chain all the way to the consumer. Such miniature barcodes would be totally unobtrusive and thus nearly impossible to tamper with, and electronically readable.

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The threats. The potential hazards posed by nanomaterials are largely unknown

Will the public accept nanotechnology? The experience of atomic energy and agricultural biotechnology provides important lessons. In the U.S., the adverse public reaction to nuclear energy has hindered its development even though it is widely used in Europe and the rest of the world. Risk communication experts have pointed to aspects such as the invisibility of radiation and the fact that cancer is a “dread disease” to explain the opposition to atomic energy in the U.S.; however, the fact is that no new nuclear plants have been built for decades.

In Europe, the public has negatively responded to agricultural biotechnology (but not the use of biotechnology in manufacture of pharmaceuticals and chemicals). While nanotechnology products already are entering the market, there is also much in the popular mind to create negative perceptions, such as science fiction and a horror film depiction of non-existent “self replicating” nanotechnology particles.

To replace irrational responses with rational ones requires the generation of information, not only about the benefits but also about the potential risks posed by nanoparticles, and agree on effective measures to prevent such risks through appropriate regulatory approaches (Michelson, undated, on line). From the past we have also learned that involvement of stakeholders - industry, government, consumers and the medical community - is essential to assure that the right



questions are asked, that information is shared and that decisions are informed by the concerns of all involved and not imposed on the public without their consent.

A starting point is to begin to understand some of the potential hazards. Not much is known. We do know that some of the characteristics of nanomaterials that make them so desirable in various applications may also pose new safety challenges. For example, as a result of changes in reactivity at the nanoscale level, the well-known toxicological behavior of common materials such as carbon, described in material safety data sheets (MSDS) for the bulk material, no longer applies (Colvin 2003). Moreover, unlike such natural nanoparticles as salt particles in marine aerosols, which are soluble, and insoluble but short-lived combustion-generated nanoparticles that have a tendency to aggregate to form larger particles, manufactured nanoparticles are often purposefully coated with substances that prevent agglomeration. This coating

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is often required because the small size of nanoparticles would promote strong aggregation once the particles are withdrawn from the liquid phase or enclosed gas phase used for manufacturing them. Thus, such coated particles may remain in their original, highly reactive form in the environment or the human body for an undetermined period of time.

Because of the very small size of manufactured nanoparticles, and particularly because of surface treatments designed to preclude nanoparticles from agglomerating into larger particles, it is



Their very small size would allow them to enter the human bloodstream via the lungs after inhalation, the digestive tract if ingested, and even the skin if applied or deposited on it, as with sunscreens already in the market.

likely that many nanomaterials entering the environment would remain in it indefinitely (Colvin 2004). Surface coatings have been shown to produce highly mobile nanoparticles, whether in the air, soil, or water. Airborne nanoparticles do not tend to settle onto surfaces and may not be retained by common respirator filters. Once deposited on soils, nanoparticles can not only traverse various strata and find their way into aquifers, but current drinking water filtering systems might not filter out many of them. Some hydrophobic nanomaterials can also form a stable colloidal species in water even when not surface treated (Alargova and Tsujii 2001). The potential hazards posed by these particles moving freely in the environment, therefore, are new to humankind.

The mobility of manufactured nanoparticles is not limited to the environment. Unlike other, naturally occurring nanoparticles that are soluble, such as saline particles, manufactured nanoparticles do not dissolve upon entering the human lungs. In addition, unlike other nanoparticles originating as byproducts of combustion engines and processes, manufactured nanoparticles, by design, would not agglomerate as much and thus could remain more reactive for longer periods of time. Instead, their very small size would allow them to enter the human bloodstream via the lungs after inhalation,

the digestive tract if ingested, and even the skin if applied or deposited on it, as with sunscreens already in the market.

There may be novel routes of exposure as well; one specific type of nanoparticle has been shown to enter the brain via the olfactory system. Once in the bloodstream, nanoparticles have been shown to be able to reach all organs of the human body. Just as this property may present unique opportunities for new medical treatments, it also presents the potential for unintentional accumulation of such particles in brain and other human tissues, calling for the urgent need to conduct research on possible adverse effects.

Certain nanotubule structures have been found to cause oxidative damage to human skin cells in culture (Shvedova *et al.* 2003). There are published reports on the adverse effects of certain carbon nanotubes infused into the lungs of mice. Responses for carbon nanotubes were more severe than the response for quartz, a known occupational hazard that was used as a positive control. With long-term exposure, there was lung necrosis and scarring (Lam *et al.* 2004). Such experiments have yet to be performed for other nanotube structures as well as other materials that already are on the market. Might there be a parallel between the toxic mechanism of this particular type of carbon nanotube in the lungs with that of asbestos, based on the nature of the pathologic response?

Whether these particular nanotubes would represent a hazard for those working in manufacturing plants is unknown. Research involving controlled clinical and animal studies using ultra-fine elemental carbon particles reported high deposition

of the particles in the human respiratory tract (ICRP 1994). These particles escaped phagocytosis by macrophages and were translocated to organs other than the lungs. Cardiovascular effects in humans and animals and mild inflammatory processes in animals were also observed. Another type of similar particles, delivered intravenously, was able to cross the blood-brain barrier (Kreuter 2001) and a possible mechanism for transport of such particles from lungs to other tissues has been proposed (Oberdörster and Utell 2002).

The above studies, however, did not deal with the various potential direct and indirect routes of human exposure to nanoparticles or with the ecological fates and transports and environmental lifecycles of such materials. Nanomaterials used in agriculture and foods would enter the human body via the digestive tract, as would those contaminating ground water. Very little is known about these issues, despite the fact that the future of nanotechnology itself may hinge on them. Early results indicate that certain types of nanoparticles may cause exposure via novel routes. In 2004, Oberdörster reported that fullerenes (C60) suspended in water may have been directly transported to the brains of fish via olfactory neurons (as is known to occur for other small substances such as viral particles) (Oberdörster 2004).

As pointed out by Colvin (2003) in a report on the potential environmental impact of engineered nanomaterials, nanotechnology is developing and nanomaterials are being commercialized without any government oversight. Workers employed in plants manufacturing nanomaterials are likely exposed to them but so are workers who use such products, for example, painters who



use nanotechnology-derived spray paints or cosmeticians who use nanotechnology cosmetics every day. However, because current Material Safety Data Sheets (MSDS) for nanomaterials list the same properties and restrictions given for the bulk material, no additional or special requirements for safety precautions are mentioned.

The United States National Institute for Occupational Safety and Health (NIOSH) estimates that up to two million workers are currently exposed through work in nanotechnology industries in the United States and at least another million workers could be so exposed in the coming ten years. No guidelines for employers have so far been issued by the Occupational Safety and Health Administration (OSHA) (Gruenwald 2004). NIOSH, recognizing the current information gap regarding the potential health effects of nanomaterials, is working with an interagency nanotechnology group to develop guidelines for dealing



► *In addition, there can be no sensible regulations unless the risks posed by these materials and techniques have been assessed, and there are few data to support such assessment. Furthermore, there are no clear guidelines to assess the risks posed by nanomaterials, and there is not even agreement on a common nomenclature for these materials and techniques that would make specific regulations clear to all concerned parties.*

with nanomaterials released in the workplace. Also participating in drafting of the guidelines will be OSHA and a working group of the Nanoscale Science, Engineering and Technology Subcommittee (NSET) of the U.S. National Science and

Technology Council. In addition, the U.S. Department of Defense has funded the development of a computational model to predict toxic, health, and biocompatible effects of nanomaterials on the basis of the structure of nanoparticles (DoD 2004).

Regulating Nanotechnology. The need for leadership and trust

The issue of regulating the growing nanotechnology industry is not a simple one. The field is quite extensive, both from the standpoint of variety of materials as well as from that of applications. In addition, there can be no sensible regulations unless the risks posed by these materials and techniques have been assessed, and there are few data to support such assessment. Furthermore, there are no clear guidelines to assess the risks posed by nanomaterials, and there is not even agreement on a common nomenclature for these materials and techniques that would make specific regulations clear to all concerned parties.

Because of the immense scope of this technology, it has been said that “regulation of nanotechnology is a process, not an event.” The applicability of the U.S. Toxic Substances Control Act (TSCA) to new nanomaterials has been the subject of debate. An extensive study on the subject was unable to confirm that the law, in its present form, was sufficient to meet the challenges posed by the growing nanotechnology industry (Bergeson 2006).

It may be argued that the “precautionary principle” should be applied, and that further development of nanotechnology should be put on hold until the potential hazards posed by nanomaterials to humans and the environment are better understood. However, such an approach might not be practical or even realistic any longer because the fundamentals of nanotechnology are already in the public domain. Prohibition

would also be devastating to and opposed by many scientists and entrepreneurs who are fully committed to developing a truly promissory technology. However, it could also be argued that a precautionary approach should especially be applied for applications that are dispersive, and that may cause persistent and irreversible long-term environmental impacts. If we have learned any lessons from the past, it is surely that development that is not sustainable is, in the long run, most damaging to economic progress. Policies will need to strike an appropriate balance between technological advancement in this area and avoidance of long-term threats to health and the environment.





► *Therefore, a determined but coordinated commitment to ascertain and anticipate adverse health and environmental effects of nanomaterials by all parties involved in nanotechnology development - academia, government, and the private sector - is essential to avert the emergence of public distrust and rejection of nanotechnology that doomed or at least slowed down the development of other novel technologies.*

Therefore, a determined but coordinated commitment to ascertain and anticipate adverse health and environmental effects of nanomaterials by all parties involved in nanotechnology development - academia, government, and the private sector - is essential to avert the emergence of public distrust and rejection of nanotechnology that doomed or at least slowed down the development of other novel technologies. Regulators need to show concern and offer guidelines and coordination, while researchers must develop ethics that emphasize self-regulation, culture and expectations (Schultz 2002). Appropriate communications, including disclosure of negative as well as positive findings, will be critical in establishing the kind of public confidence in nanotechnology that was lacking during development of other technologies.

Conclusions

Nanotechnology presents enormous potential to improve human life. However, little is known about the risks posed by nanomaterials to human health and the environment and the technology is developing in a mostly unregulated manner. Therefore, to set the appropriate scientific background for studying the optimal approach to regulating nanotechnology and nanomaterials, urgent actions are needed in several areas. Some of the actions that should be taken to address the situation are summarized below, in order:

1. A common, harmonized glossary of definitions and terms specific to this new technology must be developed and agreed upon on a global basis, so that everyone will use a common technical nanotechnology vocabulary.
2. Reference standards for nanomaterial types and sizes must be developed and made available, so that toxicologists and other researchers may access standardized materials and develop standard analytical methods.

3. Research on exposure routes to and life cycles of manufactured nanomaterials is urgently needed to support scientifically sound risk assessment of the potential health and environmental hazards posed by such materials. In addition, appropriate human health and ecological risk assessment methodology for nanomaterials and nanodevices is lacking and in need of development. These methods should be harmonized and accepted globally.
4. Finally, public participation in a process to develop a reasoned and cautious approach to the assessment and control of nanotechnology risks is called for. Careful *risk communication* should be undertaken, involving governments at all levels, industry, the medical community, researchers and the public.

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Résumé / Resumo / Resúmen

► **Bienfaits possibles et menaces de la nanotechnologie pour la santé, les denrées alimentaires, l'agriculture et l'environnement**

La nanotechnologie, champ relativement nouveau de recherche et d'élaboration de matériaux industriels, fondé sur la création de nouvelles classes de structures moléculaires originales, enregistre des progrès rapides qui promettent de changer radicalement ou de toucher de nombreuses sphères du domaine de la science et de la technologie. Elle ouvre également d'innombrables perspectives pour le progrès humain, avec la mise au point de divers types de nanomatériaux qui trouveront des applications dans des traitements médicaux révolutionnaires, dans la recherche agricole et les méthodes d'évaluation de l'innocuité des aliments, dans les procédés de remise en état de l'environnement, dans le domaine énergétique, par exemple pour le revêtement des cellules solaires, de même que dans des produits d'usage quotidien de grande consommation tels que les cosmétiques, les tissus qui repoussent la saleté et la peinture autolavable. Néanmoins, il est essentiel et urgent d'évaluer non seulement les avantages mais également les risques possibles présentés par les nanoparticules et de s'entendre sur des mesures réglementaires efficaces fondées sur des critères appropriés.

► **Oportunidades e ameaças da nanotecnologia para a saúde, os alimentos, a agricultura e o meio ambiente**

A nanotecnologia, um campo relativamente novo de pesquisa e elaboração de materiais industriais com base na criação de novos tipos de estruturas moleculares originais, mostra rápidos avanços que prometem mudar radicalmente ou afetar muitas áreas da ciência e da tecnologia. Além disso, oferece inúmeras possibilidades para o progresso humano mediante a criação de vários tipos de nanomateriais aplicáveis em revolucionários tratamentos médicos, na pesquisa agrícola e em métodos de diagnóstico de inocuidade alimentar, em procedimentos de restauração ambiental e aplicações energéticas, como o revestimento de células solares, inclusive em produtos corriqueiros de grande volume, por exemplo, cosméticos, tecidos repelentes à sujeira e pintura auto-lavável. Não obstante, é essencial e urgente avaliar não apenas os benefícios, mas, também, os possíveis riscos dessas nanopartículas e concordar medidas efetivas mediante critérios reguladores adequados.

► **Oportunidades y amenazas de la nanotecnología para la salud, los alimentos, la agricultura y el ambiente**

La nanotecnología, un campo relativamente nuevo de investigación y elaboración de materiales industriales con base en la creación de nuevas clases de estructuras moleculares originales, muestra rápidos avances que prometen cambiar radicalmente o afectar muchas esferas de la ciencia y la tecnología. Además, ofrece innumerables posibilidades para el progreso humano, mediante la creación de varios tipos de nanomateriales aplicables en revolucionarios tratamientos médicos, en la investigación agrícola y métodos de diagnóstico de inocuidad alimentaria, en procedimientos de restauración ambiental, aplicaciones energéticas como el revestimiento de células solares, incluso en productos cotidianos de gran volumen como los cosméticos, tejidos repelentes de la suciedad y pintura auto-lavable. No obstante, es esencial y urgente evaluar no sólo los beneficios, sino también los posibles riesgos que plantean las nanopartículas y acordar medidas efectivas mediante criterios reguladores adecuados.



Strategy management in government agencies Focusing efforts for sustained effect

Carlos Americo Basco¹

Summary

This paper discusses the adoption of strategic management programs in government agencies as a way of integrating tangible and intangible assets for achieving specific objectives. It describes as an example the implementation of the “balanced scorecard” method of strategy management in the Ministry of Agriculture, Fisheries and Supply (MAPA) of Brazil, through a reform launched in 2005.

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Keywords: *Management, strategy, reform, organization, institution, balanced scorecard, perspectives, intangibles.*

MAPA fact sheet

- Founded under the Empire in 1860.
- Has 9,787 employees, of whom 1,700 work at headquarters in Brasilia, 7,254 in federal agriculture offices, and 313 in national agricultural laboratories

Efficiency and value added

Government agencies face a serious dilemma in their role, which requires them to address people's needs while maintaining balance in their activity vis-à-vis other sectors of social management.

The move to globalization and the pressure to access markets are posing an unprecedented challenge to developing countries in terms of efficiency and quality. Efforts to improve business management include a vision of reality and the analysis of bottlenecks, and this inevitably gives rise to criticism of the government function, which is generally quick to collect taxes but slow to provide the services that constitute its institutional mandate.

With the passage of time, this gap between the management capacity of businesses and of government has widened, because of the elephantine bureaucratic pyramid,

while organizations under private law and private organizations under public law are networking and striving to overcome the physical and mental barriers that separate them from their clients.

Many responsibilities that formerly fell to government are now being transferred to the private sector. Indeed, a third sector (private but nonprofit) is growing and appears to be capable of bringing more agility to efforts to resolve society's needs, either jointly with government agencies or directly.

Moreover, the history of corruption and the maturity of society are generating pressures for control, which often intimidate public servants, who prefer not to confront administrative processes, and this tends to slow the fulfillment of their duties.

There are other reasons as well behind the sluggish responsiveness of the public sector. These include partisan politics, which create a mismatch between the interests of the State and of the government: every time the executive changes, decision-making is paralyzed and projects of interest to the country come to a halt. All we have to do is compare this sluggishness with the cost of government operations to arrive at a thoroughly reprehensible picture of inefficiency.

Many officials of the public administration are now wondering how to operate in such a complicated context. The central concern is to define those functions that the State must fulfill in order to target actions and



project that would take it from a position of simply reacting to the market and would allow it to position itself as an organization with a vision of the future.

This decision was part of an administrative reform launched in February of that year, which among other things created a Strategic Management Advisory Office (AGE). The idea was to project future scenarios, to deal with the concerns sparked by the challenges posed, and to incorporate them within the Ministry, which would need to find ways to enhance its capacity to meet the anticipated demands.

optimize allocated resources. To this end, an objective vision of the situation is needed, and a descriptive map of the value-added chain, which should be able to justify the existence or maintenance of the institution.

Generally speaking, the most frequently adopted solutions have given prime importance to addressing strategies and management processes, and to seeking an effective communication between people and projects. The most widely accepted method has been the balanced scorecard (BSC) of Robert Kaplan and David Norton, which is described in this document.

Change of timeframe

This is the case with MAPA in Brazil, which in 2005 decided to launch a comprehensive

In November 2005, studies produced by the AGE indicated, for example, that by 2015 Brazil will have increased its soybean exports by more than 56%, representing more than half of the country's cereal production. What would be the implications of this scenario in economic and environmental terms? What demands with this growth place on the country in terms of infrastructure? How would it affect the labor market? And even more important, what would be the role of the MAPA in this likely scenario, and how should it prepare itself for that time?

This agency would not only have to project static solutions but would also need to create a mechanism for constantly adapting to external changes. It would also have to make efficient communication part of its intrinsic nature, in order to permit and foster participation by all levels of the Ministry, and to shield the interests of the State against the shifting winds of politics.

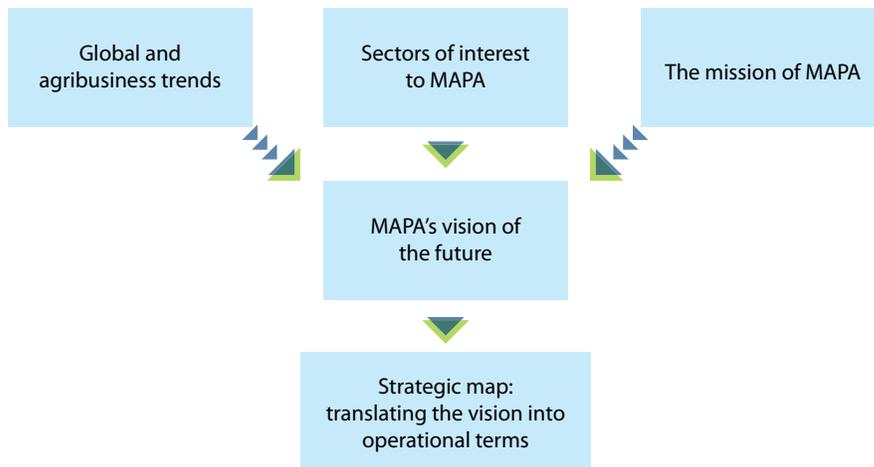


Figure 1. The strategic logic.

Source: Ministry of Agriculture, Fisheries and Supply (MAPA).

Strategy-focused organization

The response emerged as a strategy management system that is widely used by organizations in all three sectors, the Balanced Scorecard, which was previously applied to two public enterprises linked to the MAPA, the Brazilian Agricultural Research Enterprise (EMBRAPA) and the National Supply Company (CONAB).

The great contribution of Kaplan and Norton, who began to apply the BSC method around 1992, has to do with internalizing the idea of the strategy-focused organization. The words strategy, focus and organization are considered keys to the success of firms that use the method.

Norton insists that the importance of the BSC method lies not in quantification, but rather in creating value in organizations

through the execution of strategies. The capacity to execute strategies is more important than merely having strategies.

The studies that led to preparation of the BSC method showed that few organizations have a strategy. Moreover, it was found that an organization's likelihood of executing a strategy successfully ranged between only 10% and 30%. This reflected the fact that there were many tools available for supervising financial aspects, but not for the strategic aspects.

Consequently, it was decided to seek ways of mapping and defining the strategy, to make it available to everyone, to make it attractive and to allow everyone to put forward his own contribution in operational terms.

The logic of the method stresses five principles that the IICA Office in Brazil began to apply some time ago.

1. **Translate the strategy into operational terms so that it will be understood throughout the organization.**

People must be able to describe what they are doing. The strategy has to be well described and conceptualized.

2. **Align the different areas and individuals of the organization to create synergy.**

The BSC method must be able to create linkages among the different parts of the organization, through the description of the strategy.

3. **Motivate the organization, to ensure that the strategy is seen as everyone's job. Those who have specific know how must be able to understand the strategy and make their contribution to it.**

In contrast to the industrial age, knowledge economies presuppose processes of alignment from the bottom up, as well. Comprehending this contribution is relevant for the organization and essential for the success of the method. "The strategy has to become everyone's everyday job", says Norton. It has been shown that the following three elements are important in the experience of the Balanced Scorecard Collaborative:

- a) The work force must be trained.
- b) Targets must be defined that consider the organization as a whole, so that the overall strategy is understood by everyone, and everyone can determine his own contribution to it.

c) There must be a program of incentives and rewards ("compensation makes people pay attention").

4. **Learn and adapt so the strategy becomes a continual process.**

The idea is that course corrections must go beyond the financial control loop. The strategy also needs to be supervised.

5. **Mobilize leadership in favor of change.**

Experience with the method over more than a decade shows that the first step is not to implement a quantification program, but to convince the leaders to build a culture of change in the organization.

The method

The function of the BSC is to help an organization to formulate, measure and reorient its strategy with a broad vision, so that it can build a bridge between the current context and a future vision. The elements used to this end are the strategy map, initiatives, goals and indicators.

- The **strategy map** is the graphic expression of the entire strategic structure of the organization. It comprises perspectives, themes and objectives, which are organized in a cause-and-effect relationship to show how value is created in the pursuit of its activities.

- **Initiatives** are strategic projects selected by the organization for making the transition from the current situation to the future vision.
- The process is monitored by the use of **targets** and **indicators**, which make up the scorecard itself.

The conventional perspectives are the learning and growth perspective, the internal process perspective, the customer perspective, and the financial sustainability perspective. In profit-seeking organizations, the value chain is linked to the purpose of maximizing outcomes from a financial perspective, the objective of which is to satisfy the shareholders.

On the other hand, for nonprofit organizations, the financial perspective is considered to support the others. The cause and effect relationship exists in a so-called fiduciary perspective, which must meet the interests of those stakeholders who have nonfinancial expectations (figure 2).



Figure 2. The conventional perspectives and those are used by nonprofit organizations.

The strategy map prepared by MAPA (figure 3) also considers other perspectives based on intangible assets. At its base are issues relating to people, learning and growth. Initiatives in this field are designed to achieve administrative excellence, more and better information and marketing, topics that comprise the internal process perspective.

This method also has the value of guiding the organization toward the strategy, when it acts as a mediator between different forces or tendencies in the conduct of the organization's activities.

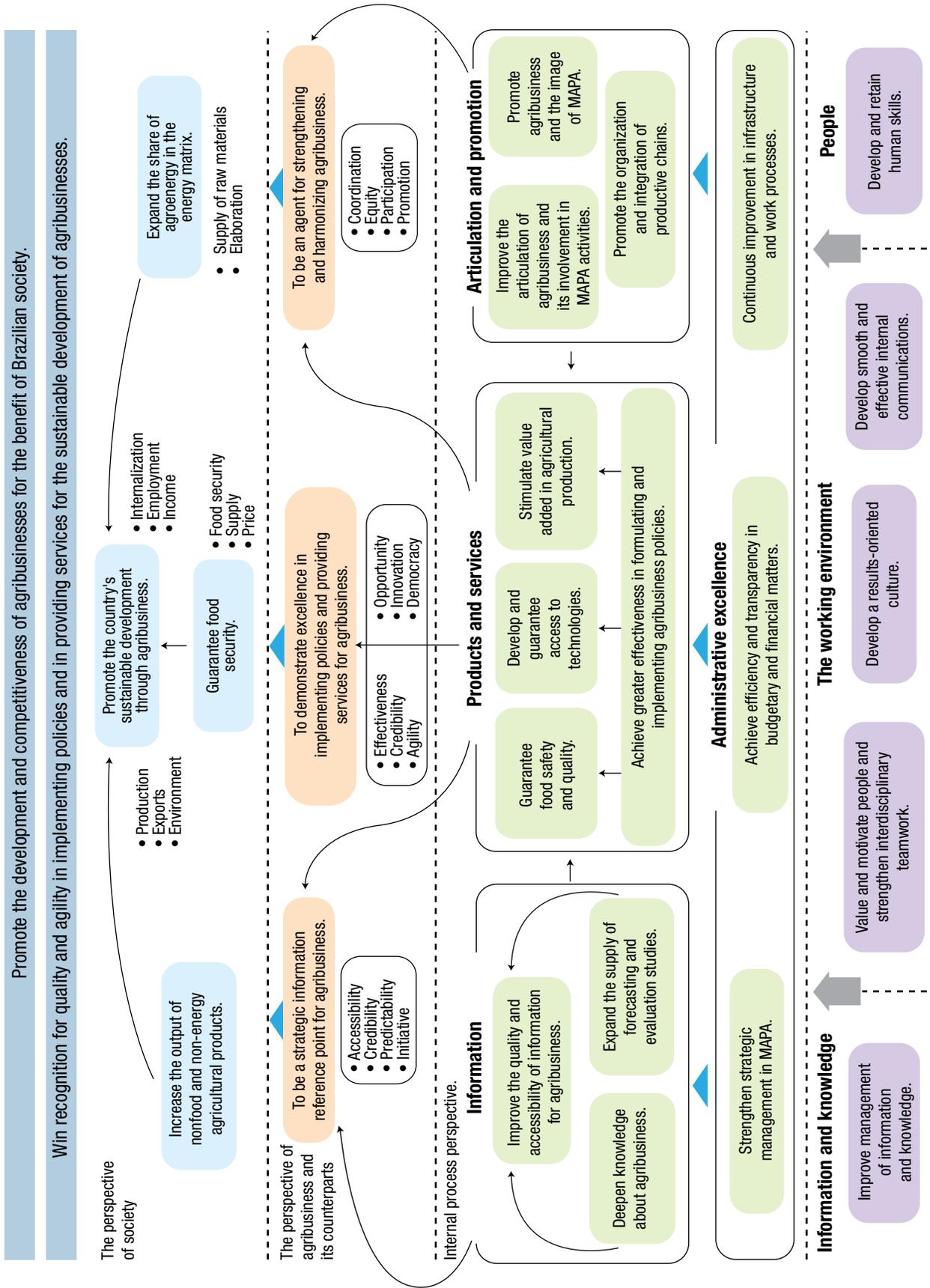


Figure 3. Strategy map for MAPA.

The critical path for implementation in MAPA

Because we are dealing with the strategic management of MAPA, we speak of a project and of a process. In this respect, the implementation project developed with IICA technical cooperation began in December 2005, and ended in September of the following year. Since the implementation project was completed, the process has continued with a pilot project for strategic double-tracking in the Agricultural Protection Department (DAS).

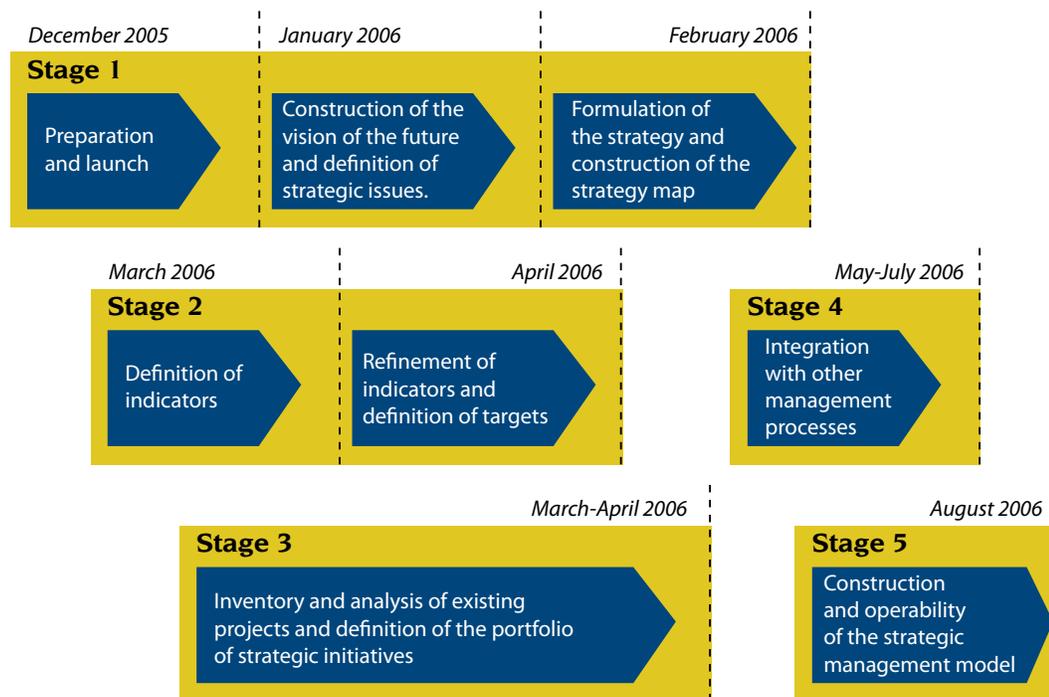


Figure 4. Retrospective view of the stages of the implementation project, according to the AGE.

■ Stage 1. *Strategic business plan and strategy map*

- Detailed project plan, with proposed timetable and suggested teams to support the evolution of the project.
- Awareness-raising meeting with senior administration.
- 25 MAPA employees trained in the BSC method.
- Renewal of the Ministry's mission and identification of the principal strategic guidelines for achieving the vision.
- Strategic business plan prepared.
- Proposed strategy map prepared.
- Report including the strategy map with cause-and-effect relationships, and description of the organization's strategic objectives.

■ Stage 2. *Indicators and targets*

- Inventory of indicators currently existing in the MAPA.
- Proposed indicators for the BSC.
- Preliminary details on indicators validated by the MAPA.
- Identification of needs for action plans to create data sources for indicators that now lack data.
- Proposed indicators validated.
- Strategy map updated.
- Clear definition of action plans for working with the new indicators.
- Proposed targets communicated and validated.

■ Stage 3. *Strategic initiatives*

- Inventory of current strategic initiatives and their analysis for inclusion in the strategy map.
- Preliminary suggestion for prioritizing initiatives.
- Strategic initiatives identified as priorities.
- Strategy map, indicators and targets updated. Implementation plan defined and validated.

■ Stage 4. *Implementation support and first strategic analysis meeting with MAPA executives*

- Initiatives: definition of mechanisms for continual management of priority initiatives and status update on the strategic initiatives for the meeting with MAPA executives.
- Indicators and targets: support for monitoring disputes, definition of action plans, assignment and communication of responsibilities and deadlines.
- Cockpit: support for improving the format of graphics and the cockpit, and defining the related standards.
- Communication: follow-up on support for implementing the communication plan.
- 25 employees trained in the concepts and methodology for holding the strategy analysis meeting.
- First analysis of the BSC: support for analyzing the elements of the BSC and production of a preliminary version of the strategy update report.

■ Stage 5. *Coordination of the BSC with existing management processes*

- Employees trained in the concepts, methods and techniques relating to coordination of the plan, the strategy maps, and operational and financial management.
- Current situation: understanding and mapping of the current model for the strategic, operational and budgetary management of the ministry.
- Analysis of this map and definition of guidelines for the future model.
- Design of the future situation: details of the future model integrating the strategic, budget and operational plans in light of expectations of the Ministry's leadership and the BSC instruments.
- Details and validation of a plan for implementing the model.

IICA's role in the planning process

Since early 2005, IICA has been helping the MAPA to prepare a Technical Cooperation Project to improve the Ministry's strategic management. MAPA technical staff had a clear grasp of the main features of the problem, but wished to design a logical framework that would validate them, and to obtain support for making the project administratively viable.

The IICA Office in Brazil offered its technical staff to help in the undertaking and sponsored a series of planning workshops from which four broad guidelines emerged: strategy management, operational management, business education, and communication.

From the outset it was recognized that four elements were necessary to success of the program, and this was demonstrated in

the course of execution: only one of the three components (strategy management) has made substantial progress. While the results have been quite worthwhile, they have had little impact because of the lack of communication between the various sectors of the ministry.

This situation is being addressed through the request to extend the Technical Cooperation Project, and a manager training program targeted at businesses. More than a hundred employees of the Ministry and of related businesses are being trained in process management, situational leadership, innovation and strategic planning, and this will create a critical mass within the MAPA capable of understanding the importance of its role as counterparty in the project.

Possibilities of replication

Implementation of strategic management in the MAPA was based on the BSC method, the contents of which have already been widely disseminated both through publications and through consulting activities. The www.amazon.com site, for example, lists nearly 3,400 books on the topic. This means that it should be quite feasible to replicate the process in other agriculture ministries of the hemisphere.

Moreover, any country interested in the experiment could count on IICA as a platform for a horizontal cooperation process. As well, we know that the method is also being applied in Costa Rica, which could be consulted.

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Résumé / Resumo / Resumen

► Gestion de la stratégie dans les organismes gouvernementaux: concentration des efforts pour produire un effet durable

Le présent article porte sur l'adoption de programmes de gestion stratégique dans les organismes gouvernementaux comme moyen de combiner des actifs tangibles et intangibles afin d'atteindre des objectifs déterminés. Il décrit, à titre d'exemple, la mise en œuvre de la méthode de gestion de la stratégie fondée sur la carte de pointage équilibrée (*balanced scorecard*) au ministère de l'Agriculture, de l'Élevage et de l'Approvisionnement (MAPA) du Brésil, dans le cadre d'une réforme lancée en 2005.

► Gestão da estratégia em órgãos governamentais: Concentração dos esforços para gerar um efeito duradouro

Este texto refere-se à adoção de programas de gestão estratégica em órgãos governamentais, como forma de integrar ativos tangíveis e intangíveis para o alcance de determinados objetivos. Cita-se como exemplo a implementação do método *Balanced Scorecard* de gestão da estratégia, utilizado no Ministério da Agricultura, Pecuária e Abastecimento (MAPA) do Brasil, a partir de uma reforma iniciada em 2005.

► Gestión de la estrategia en organismos gubernamentales: Concentración de los esfuerzos para generar un efecto duradero

El presente texto se refiere a la adopción de programas de gestión estratégica en organismos gubernamentales como una forma de integrar activos tangibles e intangibles para la consecución de determinados objetivos. Se aborda como ejemplo la implementación del método *balanced scorecard* (cuadro de mando integral) de gestión de la estrategia, en el Ministerio de Agricultura, Pecuaria y Abastecimiento (MAPA) del Brasil, a partir de una reforma iniciada en el 2005.

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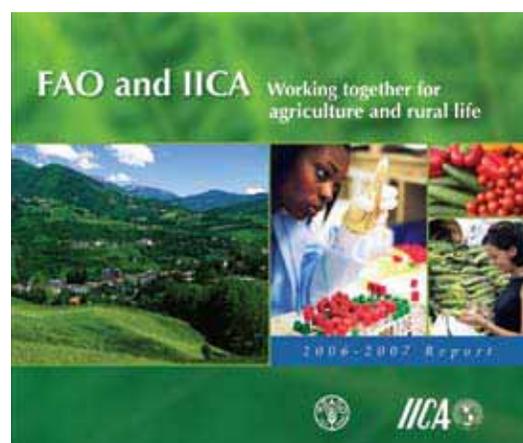
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Agriculture and Rural Life

FAO and IICA: *Working together for agriculture and rural life*
(Also available in spanish).

This report describes the main actions undertaken jointly by the United Nations Food and Agriculture Organization (FAO) and the Inter-American Institute for Cooperation on Agriculture (IICA) during the period 2006-2007. These efforts form part of a long history of cooperation that dates back many years and are derived from successive technical cooperation agreements signed between both organizations.

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Agroenergy - Rural Development

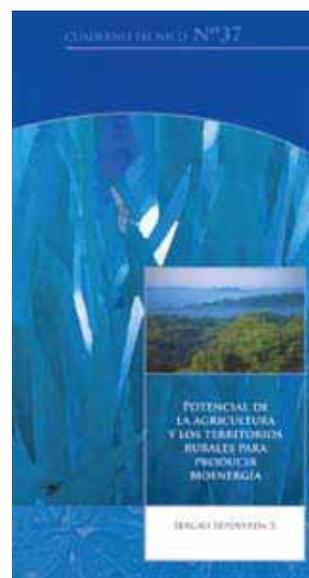
The potential of agriculture and rural areas to produce bioenergy
(Available only in spanish).

This report analyzes the possible implications that the production of biofuels may have for the major objectives of rural development, social and territorial cohesion. It begins with the theoretical principles that guide the proposed territorial focus of a sustainable rural development, to evaluate its potential as an engine of development in terms of creating employment, changes in relative prices, and possible impacts on food production.

Contents:

- Elements of sustainable development for rural areas.
- Possible social and environmental impacts.
- Scenario analysis: possible dynamics

<http://webiica.iica.ac.cr/bibliotecas/repaiica/B0667E/B0667E.pdf>



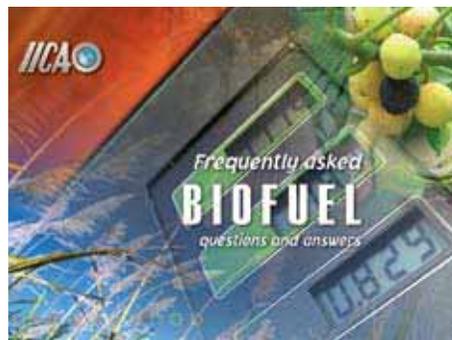
Agroenergy

Frequently asked biofuel questions and answers

(Also available in spanish)

This document is intended to answer the most frequently asked questions regarding biofuels, their current and potential uses, their advantages and disadvantages, the controversy they have caused in certain sectors, and the terminology that surrounds them.

English version available at: <http://webiica.iica.ac.cr/bibliotecas/repiica/B0645I/B0645I.PDF>



Agribusiness

Report: Third International Forum on Tropical Fruit Agribusiness

(Available only in spanish).

This report constitutes the proceedings of the Third International Forum on Tropical Fruit Agribusiness, held November 14 and 15, 2006, in Costa Rica. The event provided an opportunity for meeting, analysis and dialogue between the public and private sectors involved in the development of the fruit growing sector, with an emphasis on Central America.

Contents:

- Opportunities and market development: panel discussion.
- Business and institutional innovation.
- Business and institutional innovation for the development of exports: panel discussion.
- Innovation in the public sector and public-private partnerships for competitiveness.
- Workshops.

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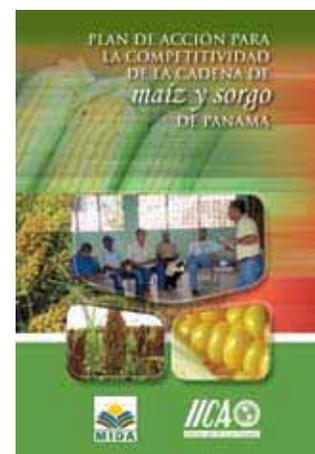
Competitiveness: the Corn and Sorghum Industry

Action Plan for Competitiveness in the Corn and Sorghum Chain in Panama.

(Available only in spanish).

This document is the product of three workshops on the corn industry in Panama, which was held in July 2007 in support of competitiveness of this industry, recognizing that it is of great socioeconomic importance to the country because of the many producers devoted to this activity, and because of its relationship with the poultry and swine industries. The action plan is based on applying the agrifood chain approach, using a methodology developed by IICA that has been used in many countries of the Americas.

<http://webiica.iica.ac.cr/bibliotecas/repiica/B0668e/B0668e.pdf>



Rural development

Methodology for estimating the level of sustainable development of territories: Biogram 2008. (Soon to be published in english).

This report presents a new version of the instrument for estimating the level of sustainable development of various territorial units. It contains the following chapters:

- I. Summary of the conceptual elements of sustainable development of rural territories and the territorial focus.
- II. Detailed explanation of the biogram methodology.
- III. How the instrument has been used in three countries: Brazil, Colombia and Peru.
- IV. A learner's guide for using the Excel 2007 program, to make it more user-friendly for persons who are unfamiliar with the program.

<http://webiica.iica.ac.cr/bibliotecas/repiica/B0664e/B0664e.pdf>

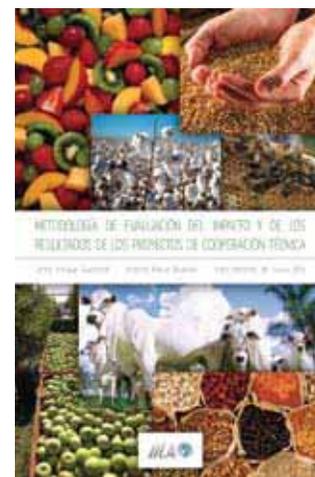


Project evaluation: technical cooperation

Methodology for evaluating the impact and results of technical cooperation projects (Available only in portuguese).

International technical cooperation organizations work through alliances with other agencies as well as with national partners in the public and private sector. In this context, there is a need to systematize experiences in order to facilitate the coordination of programs and projects in regions. This document proposes the use of organizational methodologies known by the generic name of "management by results", which stress efficiency and outcomes, and respond to the needs of various players to have transparent frameworks for evaluating and monitoring project progress and performance.

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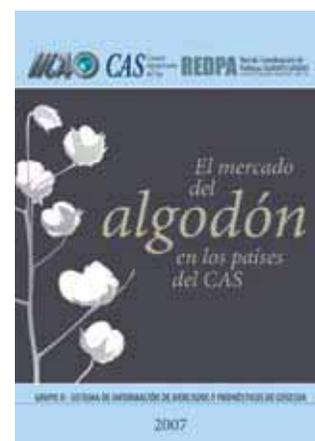


Markets - Cotton

The cotton market in the CAS countries. (Available only in spanish).

This report is a compendium of information on the cotton sector in each member country of the Southern Agriculture Council (CAS): Argentina, Bolivia, Brazil, Paraguay, Chile and Uruguay. This region currently accounts for around 6.4% of world cotton production. The report represents one of the activities pursued by the Technical Group on the Market Information and Harvest Forecast System, part of the Agricultural Policy Network (REDPA) of the Southern Agriculture Council (CAS), which operates with IICA support.

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Modernization of agriculture

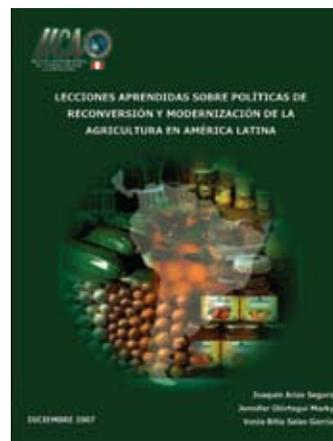
Lessons learned on policies for conversion and modernization of agriculture in Latin America (Available only in spanish)

This report describes experiences with productive conversion, as a guide for new conversion processes. It emphasizes Andean experience, but presents some examples from other regions of Latin America.

The report is divided into three sections:

1. Conceptual framework, including productive conversion modalities.
2. Policies and instruments affecting the process of productive conversion.
3. Case studies of productive conversion, primarily in the Andean region.

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Agroindustrial systems

Methodology for examining market relationships in agroindustrial systems (Available only in portuguese)

This report presents a methodology, the main purpose of which is to produce information for understanding the workings of agroindustrial markets, in response to the demands of the private sector.

It is divided into four sections:

1. Principal objective of the proposed methodology.
2. Theoretical framework underlying the research, detailing agroindustrial systems, management of the supply chain, government structures, market structure, and marketing margins.
3. Concepts used in the methodology, defining the components of the study: demarcation and mapping of the agroindustrial system; analysis of government structures; analysis of market structure; analysis of marketing margins.
4. Methodological procedures, including all the tasks that must be performed: information gathering, analysis, and final outcomes report.

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